SIBOGA-EXPEDITIE.

Siboga-Expeditie

UITKOMSTEN

OP

ZOOLOGISCH, BOTANISCH, OCEANOGRAPHISCH EN GEOLOGISCH GEBIED

VERZAMELD IN

NEDERLANDSCH OOST-INDIË 1899—1900

AAN BOORD **H. M. SIBOGA** ONDER COMMANDO VAN

Luitenant ter zee 1e kl. G. F. TYDEMAN

UITGEGEVEN DOOR

Dr. MAX WEBER
Em. Prof. in Amsterdam, Leider der Expeditie

(met medewerking van de Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën)

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THE

DECAPODA OF THE SIBOGA-EXPEDITION

PART VII

THE THALASSINIDAE AND CALLIANASSIDAE COLLECTED BY THE SIBOGA-EXPEDITION WITH SOME REMARKS ON THE LAOMEDIIDAE

BY

DR. J. G. DE MAN
IERSEKE (HOLLAND)

With 20 plates

LATE E. J. BRILL
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TO THE MEMORY

OF HIS HIGHLY ESTEEMED AND BELOVED PARENTS

THIS WORK IS DEDICATED

BY

THE AUTHOR

THE THALASSINIDAE AND CALLIANASSIDAE COLLECTED BY THE SIBOGA-EXPEDITION WITH SOME REMARKS ON THE LAOMEDIIDAE

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INTRODUCTION.

Like the *Axiidae*, also the other *Thalassinidea*, collected by the Siboga-Expedition, were already described by the author in 1905, in which year diagnoses of the new species have appeared in the "Tijdschrift der Nederlandsche Dierkundige Vereeniging (2) Deel IX, p. 599—614", excepting *Call.* (*Cheramus*) *pygmaea* n. sp. and the new variety *squamifera* of *Thalassina anomala* (Herbst), that are now described for the first time. In this work also a new description of *Callianassa audax* de Man is given, a more detailed one than the first of 1911 and with figures. Of the 10 species of *Upogebia* Leach, collected by the "Siboga", 5 and of the 15 of *Callianassa* Leach no less than 12 proved to be new to Science.

Just as was the case with the *Axiidae*, also the publication of this work has so long been delayed owing to various circumstances, but the fact that it comes now even three years later out than the *Axiidae*, has been caused by the author's researches and studies of a great number of little or insufficiently known species of the genera *Upogebia* Leach and *Callianassa* Leach, which resulted in the publication of two papers, that have appeared in the "Capita Zoologica", respectively in February 1927 and May 1928 [1]). These researches, however, enabled

1) J. G. DE MAN, A contribution to the knowledge of twenty-one species of the genus *Upogebia* Leach. With 79 illustr. on 6 plates. 's Gravenhage 1927 (in: Capita Zoologica, Deel II, Afl. 5).

——, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. With 148 illustr. on 12 plates. 's Gravenhage 1928 (in: Capita Zoologica, Deel II, Afl. 6).

the author to compose keys for the determination of all the known species of these two genera, that previously should probably have been impossible.

The figures 3—3*f* (*Callianidea typa* H. M.-Edw.) and the figures of all the species of *Callianassa* Leach have been drawn by Mr. J. F. Obbes, excepting the figures 15—15*c*, 17, 17*c*—*e*, 22*a*, 24—24*g*, 26*d*, 27, 27*a*, 29*a* and 29*b*, which, like the figures 1, 2—2*c* and the figures of all the species of *Upogebia* Leach, have been drawn by the author.

LIST OF THE SPECIES COLLECTED BY THE SIBOGA-EXPEDITION [1]).

Thalassina anomala (Herbst).
Thalassina anomala (Herbst) var. *squamifera* de Man.
Callianidea typa H. M.-Edw.
Upogebia (*Upogebia*) sp. *α*.
Upogebia (*Upogebia*) *fallax* de Man.
Upogebia (*Upogebia*) *carinicauda* (Stimpson).
Upogebia (*Upogebia*) sp. *β*.
Upogebia (*Upogebia*) *pugnax* de Man.
Upogebia (*Upogebia*) *ceratophora* de Man.
Upogebia (*Upogebia*) *monoceros* de Man.
Upogebia (*Calliadne*) *hexaceras* (Ortm.).
Upogebia (*Calliadne*) *Darwinii* (Miers).
Upogebia (*Calliadne*) *ancylodactyla* de Man.
Callianassa (*Calliactites*) sp.
Callianassa (*Calliactites*) *modesta* de Man.
Callianassa (? *Cheramus*) *Sibogae* de Man.
Callianassa (*Cheramus*) *propinqua* de Man.
Callianassa (*Cheramus*) *joculatrix* de Man.
Callianassa (*Cheramus*) *lobetobensis* de Man.
Callianassa (*Cheramus*) *intermedia* de Man.
Callianassa (*Cheramus*) *praedatrix* de Man.
Callianassa (*Cheramus*) *pugnatrix* de Man.
Callianassa (*Cheramus*) *pygmaea* n. sp.
Callianassa (*Cheramus*) *moluccensis* de Man.
Callianassa (*Cheramus*) *indica* de Man.
Callianassa (*Trypaea*) *amboinensis* de Man.
Callianassa (*Callichirus*) *placida* de Man.
Callianassa (*Callichirus*) *mucronata* Strahl.
Callianassa (*Callichirus*) *audax* de Man.

1) In this List *Call.* (*Callichirus*) *audax* de Man, which was not collected by this Expedition, is included.

Family THALASSINIDAE Dana.

This family contains only one genus *Thalassina*, created by LATREILLE in 1806 and represented only by a few species, that perhaps once will prove to be identical or to be varieties of the first described form. This species was described and rather well figured by J. F. W. HERBST under the name of *Cancer* (*Astacus*) *anomalus* in 1804 in the third Volume of the "Versuch einer Naturgeschichte der Krabben und Krebse". A second species was described by J. D. DANA in 1852 after a specimen, two and a half inches long, from shores of Telegraph Island, near Singapore: as a variety of this species two male specimens, collected at Hollandia on the northcoast of New Guinea and respectively 125 mm. and 118 mm. long, were described and figured by me, in: "Zoolog. Jahrb. (SPENGEL) Bd. 38, Heft 6, Jena 1915, p. 452, Taf. 29, fig. 16*c* and 16*d*". In this paper I established still another variety *squamifera* on specimens collected by the Siboga-Expedition off Beo, Karakelang-islands, of which variety a detailed description is now published.

The name of *Thalassina chilensis* was given in 1862 by J. STEENSTRUP and CHR. LÜTKEN to a species of *Thalassina* from the coast of Chile, of which no specimens had been at their disposal, but, having compared five specimens of *Thal. anomala* (Herbst) from the Sunda Archipelago with the figures of the chilian form in CUVIER's Règne animal, T. 48, fig. 1 and in GUÉRIN, Iconographie, Pl. 18, fig. 4, these authors were come to the conclusion that the latter should be considered as a distinct species. In my paper of 1915 (l. c. p. 454) I suggested the probability of the identity of the chilian species with *Thal. gracilis* Dana. Unfortunately I did not succeed, notwithstanding my endeavours, in obtaining specimens from the coast of Chile, neither of *Thalassina* nor of the three species of *Callianassa*, that occur on these remote shores.

In 1882 in his „Catalogue of the Australian Stalk- and Sessile-eyed Crustacea" W. A. HASWELL makes mention at p. 167 of a species of *Thalassina* from Port Curtis in the following words:

"The burrows of *Thalassinae* are abundant among the mangroves all along the coast of Queensland. There are only some fragments of one of these in the Australian Museum collection-sufficient, however, to show that the species is distinct from both *T. scorpionoides* and *T. maxima*. Port Curtis".

Thal. scorpionoides and *Thal. maxima* are synonyms of *Thal. anomala* (Herbst).

As regards their habits and mode of life *Thalassina* much agrees with the mole; like this animal the *Thalassinae* use to throw up mounds of earth on marshy plains that are one half to three quarters of a meter high. Professor K. MARTIN of the Leiden University has met with these animals during his voyage to the Moluccas, his observations are quoted by Dr. R. HORST, in: "Notes from the Leyden Museum, Vol. 15, 1893, p. 314".

LIST OF THE SPECIES OF THALASSINA LATR., KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
anomala (Herbst) 1804	Indian Ocean; Mahé; Trincomali.	
	Nicobar Islands; Mergui Archipelago.	
	Sinabang-bay and Lugu, island of Simalur	
	Lahewa, north coast of Nias	
	Telok Dalam, south coast of Nias	
	Si Oban, Mentawei-islands	
	Padang.	
	Pulu Si Trianang near Belawan on the low land of Deli, Sumatra	
	Penang; Singapore.	
	Tandjong Pandan, Billiton	
	Java; Samangka-bay, Tandjong.	
	West-Borneo, Sarawak, district of Baram; South-Borneo, Bandjermassin; East-Borneo, Samarinda, Balikpapan	
	Okinawa (Liu-Kiu-islands).	
	Philippine Islands.	
	Off Beo, Karakelang-islands.	7
	North Celebes.	
	Kema, Celebes; Makassar	
	Pare-Pare, Celebes.	
	Sumba.	
	Buru; Amboina; Ceram.	
	Patani, Halmahera; west coast of Halmahera from a river.	
	Katau, south New Guinea.	
	Borepata near Port Moresby, British New Guinea.	
	Mysore, Geelvink-bay, New Guinea.	
	Wendesi, Geelvink-bay, New Guinea.	
	West coast of the Humboldt-bay, on the north coast of New-Guinea.	In the bank of the river Mbai, in or near brackish water.
	Thursday Island.	
	Nicol-bay, north West-Australia.	
	Sydney.	
	New Britannia.	
	Fiji Islands; Kandavu, Fiji Islands.	
	Samoa Islands.	
anomala (Herbst) var. *squamifera* de Man 1915.	Off Beo, Karakelang-islands.	7
chilensis Steenstrup and Lütken 1861.	Chile.	
gracilis Dana 1852.	Shores of Telegraph Island, near Singapore.	
	West coast of the Humboldt-bay on the north coast of New-Guinea.	In the bank of the river Mbai, in or near brackish water.
sp. Haswell 1882.	Port Curtis.	

1. *Thalassina anomala* (Herbst).

Cancer (*Astacus*) *anomalus* J. F. W. Herbst, Versuch einer Naturgeschichte der Krabben und Krebse. Bd. III, Heft 4, Berlin und Stralsund, 1804, p. 45, Tab. 62.

Thalassina anomala J. G. de Man, in: Zoolog. Jahrb. (Spengel), Abt. für Systematik, Geographie und Biologie der Tiere, Bd. 38, Heft 6, Jena 1915, p. 445, Taf. 29, figs. 16—16*b* (ubi literatura).

Stat. 131. July 24/25. 5°0′ N., 125°26′. 5 E. 13 m. Off Beo, Karakelang-islands. Bottom mud and sand. One adult and one very young male.

One young female and one very young male from Samarinda, East Borneo, presented to the Zoological Museum of Amsterdam by Dr. D. MAC GILLAVRY.

One adult female and two young males collected by Mr. TISSOT VAN PATOT at Balikpapan, East coast of Borneo.

One young male, collected by Mr. J. W. VAN NOUHUYS in May 1906 at the mouth of the river Barito, south coast of Borneo, on the bank about one meter under the surface.

Two adult males and one that is half-grown from East-India, presented to the Zoological Museum of Amsterdam by Mr. P. J. L. CLEMTUÁR, physician at Tandjong Pandan, Biliton.

One full-grown male, collected by Mr. DE BUSSY at Pulu Si Trianang near Belawan on the lowland of Deli, Sumatra.

One full-grown egg-bearing female collected by Mr. KLEIWEG DE ZWAAN at Telok Dalam, south coast of Nias.

One young male, collected by Mr. KLEIWEG DE ZWAAN at Lahewa, north coast of Nias.

One full-grown female without eggs, three almost adult males and one young male collected in May and June 1913 by Mr. E. JACOBSON in Sinabang-bay on the island of Simalur, Sumatra, where this animal lives in holes in the mud; the native name is Tapah batila.

One young male, collected by Mr. E. JACOBSON in May 1913 at Lugu on the island of Simalur, near Sumatra.

Besides the preceding specimens that all belong to the Zoological Museum of Amsterdam, excepting those from the island of Simalur, still two specimens out of my private collection are lying before me, that have been described in my quoted paper of 1915; these specimens are a male and an ova-bearing female from Hollandia, in the borderland between Dutch New Guinea and Kaiser Wilhelmsland on the north coast of this great island: the male is 160 mm. long (N° 2 of the Table of Measurements (l. c. p. 455)), the female measures 200 mm.

These 22 specimens (17 ♂♂, 5 ♀♀) belong all to the typical species that differs from the two varieties *gracilis* Dana and *squamifera* de Man 1° by the antennal peduncle bearing even no trace of a scaphocerite, 2° by the characters of the abdominal sterna and 3° by the form of the chelae of the anterior legs. In my paper of 1915 the characters are already indicated by which the larger chela may be distinguished from the smaller, namely by its stouter shape, by the longitudinal row of small granules on the outer surface of the palm, which in the larger chela runs nearer to the upper border and by the existence of an oblique row of granules, that proceeds from the granulated surface of the palm on to the outer side of the immobile finger, near the prehensile border. In the typical species the sterna of the 2nd—5th abdominal somites bear on the ridge between the pleopods a median acute tubercle or spine, both in the male and in the female, and on either side of this tubercle the ridge is usually smooth; the anterior border of these sterna ordinarily bears a few small knobs or tubercles, but no one in the middle line as exists in the var. *gracilis*. As regards the number of these small tubercles on the anterior border of the sterna, the form and characters of the chelae and the armature of the carapace the typical species appears very variable, so that I wish to describe the above mentioned specimens separately.

In the first place I must call attention to a clerical error at p. 447 of my quoted paper of 1915: instead of "Nord-Celebes" on the 12th line from above read "Mysore". At my request Dr. Ernst Schüz of the Zoological Museum in Dresden has been so kind to examine the four specimens referred by Dr. J. Thallwitz (in: Decapoden-Studien, 1891, p. 30) to *Thalassina anomala*: this examination proved that only in the male from Mysore, Geelvink-bay — not in the other specimens — the antennal peduncle is provided with a well-developed, movable scaphocerite, so that the remarkable difference from the typical species, presented by the abdominal sterna, occurs both in the male and in the female of the variety *squamifera* — not in the female alone as I wrongly supposed in 1915. This fact, however, namely that the existence of a median notch or emargination on the ridge between the pleopods of the 2nd—5th segments of the abdomen coincides with the existence of a movable scaphocerite on the antennal peduncle both in the male and in the female, proves also that the two male specimens which the "Siboga" has collected at Stat. 131, have wrongly been referred by me in 1915 to the var. *squamifera*, because these male specimens do not possess a scaphocerite, while the abdominal sterna resemble those of the typical species.

The adult male from Stat. 131 is 224 mm. long from tip of rostrum to end of telson, the carapace is 82 mm. long. Gastric region smooth. The antero-cardiac region, situated between the first and the second cervical grooves, is divided into an anterior and a posterior portion by a transverse furrow, which is broadly interrupted in the middle; the anterior portion is smooth, but the posterior, though also smooth in the middle, bears on either side 8 or 9 small spines of various size. The postero-cardiac region, situated between the second cervical groove and the posterior spine, that is separated from it by a fourth transverse furrow, is somewhat rugose, but presents no spines. The triangular, slightly concave rostrum, the lateral margins of which are skirted with 7 or 8 obtuse tubercles, reaches to the anterior extremity of the penultimate joint of the antennular peduncles. The flattened region on the lateral side of the carapace, situated just below the gastric region between the lines *b* and *d* of Boas (Studier over Decapodernes Slaegtskabsforhold, 1880, Tab. IV, fig. 137) bears 8 or 9 small tubercles on its anterior margin, but appears for the rest quite smooth. The anterior margin of the gastric region is armed, on both sides, between the rostrum and the line *d* of Boas, with four acute spines; that spine, which stands nearest to the rostrum, is twice as large as the three others. The hepatic region is closely covered with small, more or less acute tubercles near its anterior margin, the greatest part of its outer surface is smooth. The branchial regions are covered on their anterior half, between the *linea thalassinica* and the oblique groove, with numerous acute spines and similar spines exist along the upper margin of that groove; the lower half of the branchial regions bears smaller, likewise more or less acute tubercles, the rest of their surface, however, is smooth, though punctate. On either side of the posterior spine one observes an oblique groove, running from the median notch in the posterior margin of the carapace towards the lateral continuation of the transverse groove already mentioned, that separates the postero-cardiac region from the posterior spine; just below and parallel with that oblique groove are three sharp spines that stand abreast.

Abdominal terga coarsely punctate above, though smooth; their lateral margins are carinate, but they become gradually less prominent on the following somites. The lateral carinae

of the 2nd somite are adorned with small tubercles; on the 3rd these tubercles are less distinct and they disappear entirely on the following somites. The lower margins of the abdominal pleura are also regularly covered with small tubercles; they are not hairy.

Left chela considerably larger than the right. Measured horizontally in the middle of its outer surface the palm of the left chela proves to be 48 mm. long and it is 38 mm. high near the articulation of the movable finger; in the middle the palm appears just half as thick as long. The upper margin bears a regular row of 13, somewhat compressed, rather obtuse teeth and 24 somewhat smaller teeth occur on the lower margin. The teeth on the lower border of the palm are not continued on to the immobile finger. The outer surface of the palm is closely covered with small granules, that are somewhat larger at the base of the immobile finger and near the carpus; near the articulation of the dactylus the palm is smooth. A longitudinal row of 25 oval depressed tubercles runs at some distance from and parallel with the upper margin; parallel with the latter another row of smaller granules proceeds across the middle of the outer surface from the carpus to near the articulation of the dactylus. The outer surface of the immobile finger is smooth; this finger bears six teeth that gradually decrease in size towards the tip. One observes, however, not far from these teeth, an oblique row of 12 or 13 small tubercles on the outer side of this finger, which row I have already described in the quoted paper, p. 450. The dactylus bears a row of depressed tubercles along its upper border; four or five rows of small tubercles at the base excepted, the outer surface is smooth. Dactylus not much longer than the immobile finger.

The dactylus of the right chela, on the contrary, is about 4-times as long as the immobile finger, flattened above and almost straight, not curved. Palm 37 mm. long, when measured along its upper margin, just as long as the dactylus; it is 20 mm. high near the articulation of this finger and only 12 mm. thick in the middle. As regards the granulation of its outer surface and the longitudinal rows of teeth and tubercles, this chela resembles the other; one observes, however, on the inner surface, just near the lower margin of the palm, two longitudinal rows of acute tubercles that run close by one another and finally unite into one, that reaches till near the end of the finger. The outer surface of the immobile finger is smooth, without an oblique row of tubercles; this finger bears 11 small acute teeth. Both chelae are closely granulated on their inner surface, on the smaller chela the granules are somewhat larger than on the left. The upper inner border of the carpus is armed with 7 or 8 more or less acute teeth, the foremost of which is spiniform; the carpus of the right leg bears still another row of small tubercles near and parallel with the inner margin, but this row does not exist on the carpus of the larger leg. This joint is somewhat granular above near the antero-external angle, for the rest almost smooth. The outer and the inner sides of the meropodites of the 1st pair are smooth, the upper margin is armed with small acute teeth and with two sharp spines near the distal end; small obtuse teeth or tubercles exist also on the lower margin, which, like the lower margin of the ischium, is fringed with long hairs. At the inner side of these hairs the lower surface of ischium and meropodite bears a longitudinal row of strong acute spines in the middle; these spines are less developed on the merus of the larger leg than on that of the right.

The four other legs agree with the figure of Herbst. The upper margin of the meri is armed with sharp spines and sharp teeth occur also on the lower border except on the second

legs; the meri of the 2nd legs are a little broader than those of the following and fringed along their lower margin with long brown hairs. The three last joints of the 2nd legs are clothed along their margins with similar hairs. The propodus of the 2nd legs is much more enlarged than that of the following, its upper margin is 14,5 mm. long, the height of the joint is just as long. This leg is subchelate, the arcuate lower margin of the propodus ending into a sharp, flattened tooth at the distal extremity.

The other male is very young, 68 mm. long. The gastric and the whole cardiac region, situated between the two *lineae thalassinicae*, are smooth, nowhere granulated or spiniferous and the sharp teeth at either side of the median spine are still wanting. The hepatic region is slightly granulated and a few granules occur along the line *b* of BOAS; the oblique groove is already fringed with hairs and armed with sharp teeth, but the branchial regions are still smooth. The lateral carinae of the abdominal terga of the 2nd and 3rd somite are smooth. As in the adult male the left leg of the 1st pair is much larger than the right. The upper border of the arms is almost smooth, there is but one spine near the distal end and there are a few small, acute teeth on the proximal third or half of this margin. Carpus smooth above. Palm of larger chela 14 mm. long along its upper margin and 10 mm. high near the articulation of the dactylus; it is 7 mm. thick in the middle. This chela is smooth and shining, but under a lens the greatest part appears finely granulated, the granules becoming gradually more distinct towards the wrist; the outer surface of the immobile finger is quite smooth, without the oblique row of small tubercles that occurs in the adult. The dactylus is still everywhere smooth above. The inner surface of the palm appears minutely granular under a lens. The right chela has already the same form as in the adult male. The upper margin of the palm is 11 mm. long and the palm is 5,75 mm. high near the articulation of the dactylus; the dactylus, measuring 10 mm., is 4-times as long as the immobile finger. The denticulation of the margins and the granulation are already the same as in the adult male, but the granulation of the palm is only visible by means of a lens. In the following legs the margins are still quite smooth, though they are already fringed with setae as in the adult.

As regards the sterna of the 2nd—5th segments of the abdomen the following must be remarked. The ridge between the pleopods of these segments bears a single conical tubercle just in the middle. The anterior margin of the 2nd sternum is smooth and unarmed, that of the 3rd and 4th bears a small conical tubercle in the middle, only half as large as the median tubercle between the pleopods, on the anterior margin of the 5th sternum, finally, one observes, on either side and close by the middle line, a small tubercle, but no small median tubercle and these two tubercles are still smaller than the median tubercle on the anterior margin of the 3rd and 4th sternum. In the other male, which is 68 mm. long, these little tubercles on the anterior margin of the sterna are not yet developed at all.

The young female from Samarinda is 110 mm. long and bears only the right cheliped, according to its characters the smaller one. Ridge between the 2nd—5th pleopods with median tubercle, for the rest smooth. The young male is only 32 mm. long, it bears only the right cheliped, which appears to be the larger one, because the ridge on the outer surface of the palm runs in the middle and on account of its shape, but there is not yet a trace of the oblique row of granules on the outer side of the fixed finger.

The full-grown female without eggs from Balikpapan is 190 mm. long and typical. Anterior portion of the antero-cardiac region smooth, posterior portion with 3 acute spines at each side, two on the anterior groove, the third behind them, more backward two rudimentary spines on each side. Postero-cardiac region with no spines, but a few impressed puncta at either side. Lower border of the abdominal pleura hairy. Median tubercle on the ridge between the 2nd—5th pleopods rudimentary, though visible. Larger cheliped on the right side, oblique row of 7 subacute granules on the outer surface of the fixed finger near the prehensile border well-developped. Upper border of merus of larger cheliped with 9 subacute granules on the proximal half, with a spine at the distal extremity and another smaller one just behind it, upper border between the latter and the granules smooth; upper border of merus of left cheliped like the other.

The two young males are respectively 100 mm. and 80 mm. long. In the younger specimen the median tubercle on the ridges between the pleopods is more distinct than in the other. Carapace and abdomen still nearly smooth, except on the margins. In both the larger cheliped is placed on the left side, the oblique row of granules on the outer side of the immobile finger is already developed; in both the upper part of the outer surface of the palm of both chelipeds is red coloured.

The young male from the mouth of the river Barito is 116 mm. long. The posterior portion of the antero-cardiac region bears already a few spines on either side. This specimen presents perhaps on each antennal peduncle a scaphocerite, I could not observe it with certainty; the median tubercle on the ridge between the 2nd—5th pleopods is, however, well-developed, for the rest the sterna are still smooth. Oblique row of 12 or 13 granules on the outer surface of the immobile finger of the right larger chela well-developed. Both chelae coloured as in the specimens from Balikpapan.

Of the three males from East-India presented by Mr. P. J. L. Clemtuár, Doctor at Tandjong Pandan, Biliton, the largest is 245 mm. long and typical. The anterior portion of the antero-cardiac region bears on either side a sharp spine posteriorly near the transverse groove that separates it from the posterior portion. The lower border of the abdominal pleura is glabrous. The median tubercle on the ridge between the 2nd—5th pleopods is well-developed, for the rest these sterna are smooth, excepting the ridge between the 2nd, on which one observes at each side two small tubercles behind one another. The anterior margin of the 4th sternum bears on the left side one, on the right two minute tubercles, that of the 5th two on each side all near the midline. Chelipeds of unequal size, the left the larger, but both show the characters of the smaller cheliped. The palm of the left chela, measured along the upper border, is 47 mm. long and 26 mm. high, near the articulation of the fingers, in the right chela these numbers are 43 mm. and 23 mm. The granulation of the inner surface of the smaller chela looks otherwise than in the adult male from Stat. 131; in the latter the granules are more numerous and nearly all of the same size, in the male from East-India, however, one observes less numerous, but larger, subacute or obtuse granules, that are interspersed between others that are very small. The upper border of the merus presents on the proximal half to just beyond the middle 11 or 12 subacute granules and two spines at the distal end, on the merus of the other cheliped the same granules proximally, but instead of the two spines only a subacute granule near the distal extremity.

The second male, presented by Dr. CLEMTUÁR, is 215 mm. long and typical. The left cheliped is the larger, the right the smaller, each with its proper characters. Ridge between the 2nd—5th pleopods with a subacute median tubercle, which on the ridge between the 2nd and 3rd is directed forward, on that between the 4th and 5th backward, lower border of the abdominal pleura somewhat hairy.

The third male from East-India is 185 mm. long and also typical. Right cheliped the larger, each chela with its proper characters. Median tubercle on the ridge between the 2nd—5th pleopods rather prominent, but obtuse; on the ridge between the 2nd one observes on each side of the middle a much smaller tubercle, the other ridges are smooth, also their anterior border; lower border of the pleura glabrous.

The full-grown male from the lowland of Deli is 255 mm. long and typical. Both chelipeds, of which the right is the larger, show their proper characters. Granules of the inner surface of the smaller chela numerous, largest on the proximal lower part, smaller on the rest of the surface. Lower border of the abdominal pleura glabrous. Median tubercle on the ridge between the 2nd—5th pleopods well-developed, prominent, these ridges for the rest smooth, excepting that of the 2nd, on which one observes on the left side a small tubercle, not on the other side; the anterior margin of the 4th and 5th sterna bears a small tubercle at each side of the middle, that of the 5th presents a third similar tubercle near the middle on the left side.

The full-grown, ova-bearing female from Telok Dalam, south coast of Nias, is 220 mm. long and typical. Chelipeds unequal, the right the larger, the chelipeds presenting the characters proper to each. Upper border of merus of larger cheliped with two spines at the distal end, of which the posterior is smaller than the other, on the left cheliped there is only one spine at the distal extremity, but along the whole length about 20 acute granules or denticles. The inner surface of the palm of the smaller cheliped looks like that of the largest male presented by Dr. CLEMTUÁR. The ridge between the 2nd—5th pleopods bears the median tubercle, but it appears on all the ridges indistinct, worn off; on the anterior margin of the 4th and 5th sternum one observes a very small tubercle at each side and close by the middle line and on the sternum of the 6th there are three small tubercles at each side of the middle on the low transverse ridge just behind the anterior border. The globular eggs are numerous, very small, with a diameter only 0,7—0,8 mm. long.

The young male from Lahewa, north coast of Nias, measures 115 mm. Median tubercle on the ridge between the 2nd—5th pleopods well-developed, prominent, subacute, for the rest these ridges are smooth, except the ridge between the 2nd pleopods that presents at each side of the median tubercle a smaller one. On the ridge just behind the anterior border of the 6th sternum a small tubercle is observed at each side, close by the middle line, while there are 6 small tubercles on the posterior margin of this sternum. The chelipeds are equal and present both the characters of the smaller cheliped; there are two spines distally and the rest of the upper border of the merus is finely denticulate.

The full-grown female without eggs from Sinabang-bay on the island of Simalur is 250 mm. long. The posterior portion of the antero-cardiac region is aculeate by 9 or 10 acute spinules, the postero-cardiac region bears no spinules, but a few impressed puncta. Branchial region smooth in the middle, but the rest of its surface covered with spinules. Lower border

of the abdominal pleura glabrous. Median tubercle on the ridge between the 2nd—5th pleopods distinct, but small, little prominent, for the rest these sterna are smooth; there are 2 or 3 little tubercles on the ridge just behind the anterior border of the 6th sternum, a few also on the posterior border. The chelipeds are equal and both present the characters of the smaller cheliped; upper border of merus denticulate along its whole length, with the two spines at the distal end.

Of the three almost adult males of the same locality two are about 200 mm., the third 190 mm. long. In the two males, long 200 mm., the chelipeds are typical, unequal, in one the larger cheliped is placed on the right, in the other on the left side. In the former the median tubercle on the ridge between the 2nd to 5th pleopods is conical, prominent, perpendicular to the ridge between the 2nd and 3rd pleopods, slightly directed backward on the ridge between the 4th and 5th. Otherwise than in the other males in this collection the small tubercles on the anterior border of these sterna are very developed and numerous; on the anterior border of the 2nd sternum there are two tubercles near one another on each side, quite laterally, the ridge between the pleopods bears a small tubercle at each side of the median tubercle; the anterior border of the 3rd and 4th sterna bears on the right side four, on the left three little tubercles at each side of the middle, that of the 5th three on the right, two on the left side; the ridge on the middle of the 6th sternum bears at each side five tubercles, the posterior margin six or seven at each side, one observes moreover, just before the ridge on the middle of the sternum, at each side and close by the middle still one small tubercle, that is somewhat larger on the right side. In the other male the median tubercle on the ridge between the 2nd—5th pleopods is also prominent, but in all perpendicular to the ridge; the ridge between the 2nd pleopods bears two smaller tubercles on each side of the median tubercle, but on the three following these lateral tubercles are wanting; the anterior border appears on all the sterna smooth, except the 5th, where one observes a small tubercle at each side and close by the middle line; the anterior margin of the 6th sternum is also smooth, but the ridge on the middle bears at either side of the middle three small tubercles of unequal size and the posterior margin is also granular.

In the third male, long 190 mm., the median tubercle on the ridge between the 2nd—5th pleopods is likewise prominent, rather obtuse; on the ridge of the 2nd sternum three minute tubercles are visible to the right and one to the left of the median tubercle, the ridges of the three following are smooth; on the anterior margin of the 2nd and 3rd sternum there is a small tubercle at the right side, quite laterally, not on the left; on the anterior margin of the 4th there are two small tubercles at each side of the middle, on that of the 5th two at the right, three at the left side of the middle line; seven small tubercles exist on the ridge of the 6th sternum and there are 9 or 10 small granules on the posterior margin. Lower border of the pleura glabrous, the subacute denticles well-developed. Chelipeds equal, presenting the form and characters of the smaller cheliped, upper border of the merus with the two distal spines, the other teeth small and acute.

The young male from Sinabang-bay, finally, is 90 mm. long and differs from the preceding males of the same size. The semi-circular anterior border of the antero-cardiac region is armed at each side with four, thus with eight spines, the anterior portion of this region appears, however, quite smooth, the posterior bears five spinules at each side. The glabrous lower border of the abdominal segments is armed with acute spinules, that are comparatively larger

than in the preceding males. Median tubercle on the ridge between the 2nd—5th pleopods prominent, acute, these ridges are for the rest smooth, like also the anterior margin of the sterna, excepting the anterior margin of the 5th, that bears an acute granule just to the right of the middle; the ridge on the 6th sternum bears two acute granules on each side of the middle. Chelipeds unequal, typical, the right the larger; the distal half of the upper border of the merus is armed in both chelipeds with five or six acute spines, including the two distal spines.

The young male, which Mr. E. JACOBSON has collected in May 1913 at Lugu, on the island of Simalur, measures 105 mm. and agrees with the preceding young male from Sinabang-bay. Chelipeds unequal, the right the larger, each with its proper characters; the oblique row of granules on the outer surface of the immobile finger is still wanting. Median tubercle on the ridge between the 2nd—5th pleopods prominent, acute, but for the rest these sterna are perfectly smooth; the 6th sternum is also smooth, excepting three little tubercles near the middle of the ridge.

2. *Thalassina anomala* (Herbst.) var. *squamifera* de Man. Pl. I, fig. 1.

Thalassina anomala (Herbst) var. *squamifera* J. G. de Man, in: Zoolog. Jahrbücher (SPENGEL), Abt. f. System., Geographie und Biologie der Tiere, Bd. 38, Heft 6, Jena 1915, p. 447.

Stat. 131. July 24/25. 5°0′ N., 125°26′. 5 E. 13 m. Off Beo, Karakelang-islands. Bottom mud and sand. One female of medium size without eggs and one young female.

One young female from East-India, presented to the Zoological Museum of Amsterdam by Dr. P. J. L. CLEMTUÁR at Tandjong Pandan, Biliton.

The variety *squamifera* differs from the typical species by the antennal peduncle being provided, both in the male and in the female, with a small movable scaphocerite and by the different shape of the ridge between the 2nd—5th pleopods: instead of a median conical tubercle this ridge presents at each side of the middle, both in the male and in the female, a tubercle followed laterally by a few smaller ones and between these two submedian tubercles the ridge is emarginate, notched.

The larger female from Stat. 131 is 160 mm. long. In the full-grown male of the typical species collected at this Station (p. 6) the posterior margin of the first cervical groove is smooth, in this female, however, it bears 5 or 6 very small tubercles on each side of the middle. Except a few granules just near the *linea thalassinica* the posterior portion of the antero-cardiac region appears quite smooth. The spine on the posterior margin of the carapace appears in this female like also in the other which is 108 mm. long, much less developed and much shorter than in the males of the typical species. The 3 or 4 sharp spines on each side are already present in both females. In the larger one the hepatic and branchial regions are already granulated, though the granules are little prominent on the upper half of the latter. The lateral carinae of the 2nd abdominal segment are already somewhat tubercular in both females, but those of the following are smooth. In the larger female the right leg is the larger, but both chelae show the characters of the smaller chela in the typical species. The right chela appears therefore somewhat less high, near the articulation of the dactylus, in proportion to the length of the palm than in the typical male, the palm being 31,5 mm. long, measured in the middle, and only 15,5 mm. high near the articulation of the fingers. The upper margin of the palm is armed with 10 sharp compressed teeth, curved forward, the lower

border, however, with 28 obtuse tubercles that are situated close together and that do not extend on to the immobile finger. This chela is 11 mm. thick. The palm of the left chela is 31 mm. long, 11,5 mm. high near the dactylus and 7,5 mm. thick; the dactylus measures 24 mm. and is 5-times as long as the immobile finger. There are 12 compressed teeth on the upper margin of the palm and 29 obtuse tubercles on the lower. As regards the granulation etc. both legs almost agree with those of the typical male. In the other female the legs of the 1st pair are wanting.

In my quoted paper on the Macrura of the north coast of New Guinea I have already dealt with an observation made by Dr. THALLWITZ, in his work "Decapoden-Studien, 1891, p. 30", on the form of the abdominal sterna in an adult male from Mysore, Geelvink-bay. This author observed between the abdominal appendages of the 2nd—5th somites a transverse crest, which was strongly denticulated on either side of a median notch; the female, however, should be characterized, instead by a transverse crest, by a single tubercle situated just in the middle between the pleopods of each somite. THALLWITZ believed to have discovered a secundary sexual character, which he had, however, not found mentioned in literature. I have shown in my quoted paper that this is not the cause, because in the typical species the abdominal sterna present nearly the same form and structure both in the male and in the female, the ridge between the 2nd—5th pleopods bearing a single conical tubercle in the middle.

Now it is a quite remarkable fact that the two females from the Karakelang Islands show another structure of their sterna than in the typical species and that they agree in this character with the male from the Geelvink-bay described by THALLWITZ. The transverse crest that is situated between the pleopods of the 2nd—5th sterna is rather little prominent, different from the male of THALLWITZ, and the anterior margin appears in the four sterna quite smooth and unarmed. The ridge, situated between the pleopods, presents no tubercle in the middle line, but one observes, on either side of the latter and close by it, a conical elevation covered with two or three small tubercles and between the two elevations a notch. Those parts of the ridge, situated between the elevations and the pleopods, are not dentate, but quite smooth. One observes on the ridge of the 2nd sternum, on either side of the middle line, only a small tubercle which is surrounded by 2 or 3 still smaller ones, so that no notch is formed. In the other female, which is much younger, only 107 mm. long, a notch is not yet formed on the ridge between the pleopods, but one observes a small tubercle on either side of the middle line and, between this tubercle and the pleopods, on the sternum of the 2nd segment four or five still smaller tubercles, on that of the 3rd two and on that of the 4th and the 5th only one.

According to H. MILNE-EDWARDS [1]), BOAS [2]), SPENCE BATE [3]) and BORRADAILE [4]) the antennal peduncle should present no vestige at all of an antennal scale; the last mentioned author remarks in his useful paper on the Classification of the *Thalassinidea* (l. c.) "There are some small irregular knobs between the second and third joints of the antennal stalk, but BOAS shows

1) H. MILNE-EDWARDS, Hist. Nat. Crustacés. T. II, 1837, p. 315.
2) J. E. V. BOAS, Studier over Decapodernes Slaegtskabsforhold, Köbenhavn, 1880, p. 103.
3) C. SPENCE BATE, Report Challenger Macrura 1888, p. 20.
4) L. A. BORRADAILE, in: Ann. Mag. Nat. Hist. Ser. 7, Vol. XII, 1903, p. 541.

that neither of these represents the scale." It is therefore a remarkable fact that in the two females from the Karakelang Islands both antennal peduncles are provided with a very small movable scale. In the larger female which is 160 mm. long, the 2nd joint of the antennal peduncles bears a small triangular scale, acuminate anteriorly, 1,5 mm. long and half as broad at its base (Fig. 1); in the younger female it is but little shorter and the shape is the same.

As has been described in my paper on the Macrura of the North Coast of New Guinea, in the typical *Thal. anomala* no vestige at all of an antennal scale is observed, but in two male specimens of medium size from Hollandia, that were described by me as a variety gracilis Dana, the 2nd joint bears a very small conical tubercle, barely 0,75 mm. long, movable and equally developed on both peduncles: this small tubercle, however, is certainly homologous with the small scale that exists in the two females from the Karakelang Islands. The existence of an antennal scale in *Thalassina scorpionoides* = *anomala* (Herbst) has, however, already been suggested by STRAHL in 1861, in: Monatsber. Berliner Akademie, p. 1067, but BOAS, speaking about it (l. c. p. 103), surmises that STRAHL has taken the menisc for a scale and BOAS adds that, having examined even a large specimen of *Thalassina*, he did not find a scaphocerite (J. E. V. BOAS, l. c., p. 103, foot-note). The two females from Stat. 131 are stone-red above, grayish on the sides. The female from East-India, presented by Dr. CLEMTUÁR, agrees whith those from Stat. 131 and is 130 mm. long. The anterior margin of the antero-cardiac region bears 4 or 5 very small granules at each side. The lateral carinae of the 2nd segment of the abdomen bear acute granules on their anterior half, those of the following segments are smooth. On both antennal peduncles the movable scaphocerite is well-developed. The chelipeds are subequal, the left a little larger than the right, and apparently show both the characters of the smaller cheliped; the palm of the left chela, measured along the upper border, is 19 mm. long and at the level of the articulation of the fingers 10 mm. high, for the right chela these numbers are 18 mm. and 9 mm.; the granules of the longitudinal lines on the outer surface of the palm and on the lower border are larger, more prominent in the smaller chela than in the other. Upper border of the merus armed on its distal half with 4 or 5 sharp spines. Abdominal sterna as in the females from the Karakelang Islands. On the ridge between the 2nd pleopods one observes 4 granules at each side of the middle, which is smooth, though not yet emarginate; of these granules the two inner ones are situated behind one another and smaller than the two lateral; the ridges between the 3rd—5th pleopods are distinctly emarginate, notched, and bear at either side of the middle on the 3rd and 4th sternum 4 or 5 small granules, irregularly arranged, on the 5th one rather large tubercle with a smaller granule near it; the anterior margin of these sterna like also the 6th sternum are smooth, without granules.

It is remarkable that specimens of the var. *squamifera* occur in the same locality together with typical ones. There are at present four specimens of this variety known, the male, long 150 mm., from Mysore, Geelvink-bay, described by Dr. THALLWITZ in 1891 and the three females now described: it must be left to later researches to examine whether the characters of this variety are indeed constant, so that the possession of the scaphocerite constantly coincides with the characters of the sternal ridges.

Family LAOMEDIIDAE Borr.

The little family of the *Laomediidae*, that agree with the *Axiidae* in the abdominal pleura being of a good size but differ by the presence of the *linea thalassinica*, may be distinguished from the *Thalassinidae* and *Callianassidae* by the first character and by the existence of a suture on both exopodite and endopodite of last limb. This family contains only three genera, each with one species. *Laomedia astacina* de Haan is still only known from Japan. The second, *Jaxea nocturna* (Chiereghin), occurs in the Adriatic, where according to SELBIE it is found most plentifully, whereas according to PESTA it is there rather not common, though regularly observed; it has very rarely been observed also in the Gulf of Naples; a single adult specimen was taken in the Irish Sea in 1905, another adult specimen was captured by the Scottish Fishery Board cruiser, GOLDSEEKER, in Loch Fyne in 1908. Though these are the first two adult specimens to be found in British waters, fragments of *Jaxea* were found in fish taken near Ailsa Craig, in the Firth of Clyde, in 1899.

The larval form, *Trachelifer*, has been taken with considerable frequency in the Irish Sea and on the west coast of Ireland and Scotland. It is found fairly widely distributed in the Mediterranean (C. M. SELBIE, The Decapoda Reptantia of the Coasts of Ireland. Part I. London 1914, p. 99, in: "Fisheries, Ireland, Sci. Investig., 1914, I (1914)".

The third species is *Axianassa intermedia* W. L. Schmitt from Curaçao, where specimens have been collected in a muddy creek at Spanish Port and in Caracas Bay.

For this species Mr. WALDO L. SCHMITT has established in 1924 a new family, the family *Axianassidae* (WALDO L. SCHMITT, The Macruran, Anomuran and Stomatopod Crustacea, in: "Bijdragen tot de Dierkunde uitgegeven door het Koninklijk Zoölogisch Genootschap Natura Artis Magistra te Amsterdam. Afl. XXIII, p. 76, Pl. VIII, figs. 4, 5). After the examination of three type specimens of this species, for which I am obliged to the Direction of the Zoological Museum of Amsterdam, I came to the conclusion that this family must be considered as untenable and that the genus *Axianassa* should be added to the family *Laomediidae* Borr. The characters, indeed, of this family, mentioned by Dr. BORRADAILE in his practical paper "on the Classification of the Thalassinidea" in: Annals and Mag. of Nat. Hist. Ser. 7, Vol. XII, Nov. 1903, p. 540, are also all observed in *Axianassa intermedia*, excepting only the existence of a suture on the exopodite and the endopodite of the last pair of limbs. This character, however, does not justify the creation of a new family, an opinion at once proved by the fact that in four of the seven genera, composing the family *Axiidae*, no suture on the

uropods exists, while it is present in the three other ones. *Axianassa intermedia* bears a close resemblance in some characters to *Laomedia astacina* de Haan from Japan, in other characters to *Jaxea nocturna* (Chiereghin). The rostrum of *Laom. astacina* is described by DE HAAN as "obtuso-trigona", looking like that of *Axianassa intermedia* (Pl. I, fig. 2) and the same resemblance is presented by the merus of the 1st pair of legs, which he describes as "brachia trigona, dilatata, latere interno plana, externo convexa laevia, carina superiore barbata"; the merus has an odd characteristic form, as is distinctly visible in fig. 4 of SCHMITT's paper and this close resemblance proves of course the relationship. The following legs show likewise a great resemblance, those of the 2nd pair are simple and the characteristic form of the dactyli of the 3rd and 4th legs is also observed in *Laom. astacina*.

The telson is rounded posteriorly and the uropods show also nearly the same form. In *Laom. astacina*, however, the peduncles of the two pairs of antennae are short, of a stout shape, but in *Jaxea nocturna* they present the same characteristic slender form as in *Axianassa intermedia* (Confer: C. HELLER, Die Crustaceen des südlichen Europa, Wien 1863, Taf. VI, fig. 16). The external maxillipeds (Pl. I, fig. 2*a*) of *Axianassa* are destitute of an exopodite, which exists both in *Laomedia* and *Jaxea*, but the lack of this organ does also not justify the establishment of a new family.

When I was studying the external maxillipeds of one of the type specimens under the microscope, the inner border of the merus proved to be not only fringed with the long hairs that occur also on the other joints, but to be beset moreover, except the proximal fifth part, with curious fusiform hairs (Fig. 2*b*, 2*c*), that end in more or less long setae. I do not know what they are.

The branchial formula, finally, of *Axianassa* fully agrees with that of the *Laomediidae*.

LIST OF THE KNOWN SPECIES OF LAOMEDIIDAE.

SPECIES	HABITAT	DEPTH IN FATHOMS
	Laomedia de Haan 1849.	
astacina de Haan 1849.	Bay of Tokio. Nagasaki. Satsuma.	
	Jaxea Nardo 1847.	
nocturna (Chiereghin) 1818 . . .	Adriatic (Venice, Triest, Quarnero, Pirano, Rovigno, Zara, Ancona).	In mud and burrows at a depth of 8 fathoms on the coast.
	Bay of Naples.	Extremely rare; according to Lo Bianco taken only once in twenty-five years in the Bay of Naples.
	Irish Sea (13 miles off Clogher Head, Co. Louth).	32½; mud.
	Loch Fyne, Scotland.	34

SPECIES	HABITAT	DEPTH IN FATHOMS
	Near Ailsa Craig, in the Firth of Clyde.	Fragments of *Faxea* in fish. The larval form, *Trachelifer*, has been taken with considerably frequency in the Irish Sea and on the west coast of Ireland and Scotland. It is found fairly widely distributed in the Mediterranean.

Axianassa W. L. Schmitt 1924.

intermedia W. L. Schmitt 1924.	Spanish Port, Curaçao. Caracas Bay, Curaçao.	From a muddy creek.

Family CALLIANASSIDAE.

The family *Callianassidae* contains at present nine genera: *Metaxius* (Bouv.) (1), *Meticonaxius* de Man (1), *Callianidea* H. M.-Edw. (2), *Upogebia* Leach (45 and 2 var.), *Gebicula* Alcock (2), *Bigea* Nardo (1), *Ctenocheles* Kish. (1), *Glypturus* Stimps. (3) and *Callianassa* Leach (76 and 3 var.). The numbers in parenthesis indicate by how many species each genus is represented. The whole family contains thus about 132 species and 5 varieties, which, only eleven excepted, belong all to the genera *Upogebia* and *Callianassa*. No less than 27 species have been collected by the Siboga-Expedition, viz., 10 of *Upogebia* and 16 of *Callianassa*, of which 5 respectively 12 proved to be new to Science, finally *Callianidea typa* H. M.-Edw. Diagnoses of all these new species, excepting only *Call.* (*Cheramus*) *pygmaea* n. sp., were published by the author already in 1905, in: Tijdschrift der Ned. Dierk. Vereen. (2) Dl. IX, p. 599—614, but it is owing to several circumstances that this work does appear only now. In this work moreover a detailed description with figures is published of *Call.* (*Callichirus*) *audax* de Man, that was not collected by the "Siboga".

Of *Upogebia* (*Upogebia*) *carinicauda* Stimps. 18 specimens were captured, of *Call.* (*Calliactites*) *modesta* de Man 12, of *Call.* (*Cheramus*) *joculatrix* de Man 38, of *Call.* (*Callichirus*) *mucronata* Strahl 7 and of *Callianidea typa* H. M.-Edw. 10, but of all the other 22 species only one specimen was taken, rarely two, of *Upog.* (*Calliadne*) *ancylodactyla* de Man three. It is apparently due to the burrowing habits of these animals, which render capture difficult, that usually only one individual was taken and chance circumstances have probably caused that of the five above-mentioned species larger numbers of specimens have been captured. I treat of this fact also in the Introduction to the genus *Callianassa*.

It appears to me probable that the genus *Metaxius* Bouv. is *identical* with the genus *Meticonaxius* de Man. *Metaxius* was established on a single specimen, long 13 to 15 mm., taken by the "Blake" at a depth of 115 fathoms at Stat. 123, Santa Cruz, to which the name of *Metaxius microps* was given. A brief diagnosis was published by the author in the "Compt. Rend. de l'Acad. des Sciences de Paris; Séance du 20 Novembre 1905, Tome 141, Paris 1905, p. 804; a detailed description with a figure of the whole animal in a lateral view and one of

the frontal region, looked at from above, has appeared in 1925 in the Memoirs of the Museum of Compar. Zoology at Harvard College, Cambridge, U. S. A., 1925, p. 469, text-figure 29. The genus *Meticonaxius* with the single species *monodon*, taken at a depth of 180 fathoms off the north-east point of Java, was described by me in detail and figured in Monograph XXXIX*a*[5], 1925, of this work, but a diagnosis of both genus and species was published by me previously in: Tijdschr. d. Ned. Dierk. Vereeniging (2) Dl. IX, August 1905, p. 592, 593. When the two genera are indeed identical, the name *Meticonaxius* should have the priority, being published three months earlier.

The genus *Glypturus* was established by STIMPSON in 1866 for *Glypturus acanthochirus* from the West-Indies and should differ from *Callianassa* by the external maxillipeds that are indurated and the ischium and merus of which are not dilated, not broader than the propodus, and concave on the outer surface, furthermore by the caudal lamellae, the uropods, which are deeply sculptured. Similar deeply sculptured uropods, in which the outer lamella looks as if composed of two pieces soldered together, the outer one of which overlaps the inner, are, however, observed in many species referred to the genus *Callianassa* and as regards the other character I may remark that the shape of the external maxillipeds varies so extraordinarily in the numerous species of *Callianassa*, that in my opinion the narrowness of the ischium and merus, compared with the breadth of the propodus, ought to be considered as a specific character. Unfortunately, as far as I am aware, *Glypt. acanthochirus* has never been figured.

Concerning the two other species, referred to the genus *Glypturus*, I would remark the following. STIMPSON in: Annals Lyceum Nat. Hist. Vol. X, New York 1871, p. 122, does compare his *Glypt. acanthochirus* with *Callianassa grandimana* Gibbes, of which no specimens were at his disposal, for he writes "if the description given by that author (GIBBES) is correct" and therefore rightly and out of prudence he does not refer GIBBES's species to his genus *Glypturus*. *Callianassa grandimana* has recently been examined by BALSS in: Zoolog. Anzeiger, Bd. LXI, 1924, p. 179 and in this description one reads that the ischium and the merus are dilated. BALSS, however, committed a mistake when writing "STIMPSON (1871, p. 121) hat die Art wegen der Form ihres Telsons und ihres dritten Maxillarfusses (verbreitertes Ischium und Merus mit starker Kaulade auf der Rückseite) zu seiner Gattung *Glypturus* gestellt", because STIMPSON did not at all refer this species to *Glypturus* and he should not have referred it to this genus, when he had known that the ischium and the merus, which joints are not described by GIBBES, are dilated. *Call. grandimana* Gibbes is certainly a true *Callianassa*, related to *Call.* (*Callichirus*) *longiventris* A. M.-Edw., but it proved impossible to insert this species into the key, because the caudal fan and the two pairs of antennae are unknown.

As regards the third species of the genus *Glypturus*, *Glypt. Branneri* Rathb. from Brazil (M. J. RATHBUN, in: Proc. of the Washington Academy of Sciences, Wash. 1900, Vol. II, p. 150, Pl. VIII, figs. 5—8), it certainly also belongs to the genus *Callianassa* and appears even closely related to *Call.* (*Cheramus*) *pachydactyla* A. M.-Edw. from the Cape Verde Islands. According to figure 7 in Dr. RATHBUN's paper the ischium and the merus of the external maxillipeds are in this species even a little broader than the dilated propodus and the caudal lamellae are not deeply sculptured, characters that disagree with STIMPSON's diagnosis.

Key to the Genera of the Family *Callianassidae*.

a_1 No *linea thalassinica*.
Second to fifth pleopods all alike . . . . . Subfamily *Callianideinae* n.
b_1 Margins of the 2nd—5th pleopods fringed with long setae.
Thoracic legs of 1st pair equal [1]).
General appearance that of the *Axiidae* . . . . . *Metaxius* Bouv. and *Meticonaxius* de Man
b_2 Margins of the 2nd—5th pleopods fringed with soft and flexible, articulated, membranous filaments.
Thoracic legs of 1th pair unequal.
General appearance that of *Callianassa* . . . . . *Callianidea* H. M.-Edw.
a_2 *Linea thalassinica* present.
c_1 Rostrum large. Thoracic legs of 1st pair equal. No *appendix interna* on the pleopods of the 3rd to 5th pair . . . . Subfamily *Upogebiinae* Borr.
d_1 Thoracic legs of 2nd pair simple.
e_1 Thoracic legs of 1st pair chelate or subchelate. Uropods not longer than telson . . . . . *Upogebia* Leach
e_2 Thoracic legs of 1st pair simple. Uropods longer than telson . . . . . *Gebicula* Alcock
d_2 Thoracic legs of 2nd pair chelate . . . . . *Bigea* Nardo
c_2 Rostrum small. Thoracic legs of 1st pair unequal. An *appendix interna* on the pleopods of the 3rd to 5th pair . . . Subfamily *Callianassinae* Borr.
f_1 Right chela of the larger cheliped resembling the right chela of *Thaumastocheles*, fingers nearly twice as long as the palm, slender, prehensile edges armed with long, sharp teeth, alternating with some number of smaller teeth. Second to fifth pair of pleopods all alike . . . . . *Ctenocheles* Kish.
f_2 Right chela of the larger cheliped not resembling the right chela of *Thaumastocheles*, but of the usual form. Second pair of pleopods unlike the following pairs [2]).
g_1 Ischium and merus of external maxillipeds not dilated, no broader than the propodus, and concave on the outer surface. Caudal lamellae deeply sculptured . . . . . *Glypturus* Stimps.
g_2 Ischium and merus of external maxillipeds broader than the propodus. Caudal lamellae sculptured or not . . . . . *Callianassa* Leach

1) In the single known specimen of *Metaxius microps* Bouv. the right cheliped was wanting; this genus, however, is probably identical with *Meticonaxius* and therefore I suppose the thoracic legs of 1st pair to be equal as in *Meticonaxius*.

2) Sometimes, though probably very rarely, the second pleopods are, like the following, also broadly lamellar, so e. g. in *Call.* (*Calliactites*) *caecigena* Alcock and Anderson.

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INVESTIGATIONS

LIST OF ALL THE SPECIES OF CALLIANASSIDAE, KNOWN AT PRESENT

MAY 1928

SPECIES	HABITAT	DEPTH IN FATHOMS
	I. Genus Metaxius Bouv. 1905.	
microps Bouv. 1905	Santa Cruz.	115
	II. Genus Meticonaxius de Man 1905.	
monodon de Man 1905	Off the north-east point of Java. Lat. 7° 46′ S., long 114° 30′.5 E.	180
	III. Genus Callianidea H. M.-Edw. 1837.	
elongata (Guérin) 1832	Mariannes Islands.	Perhaps identical with *Callianidea typa* H. M.-Edw.
laevicauda Gill 1859	Barbados.	Under rocks, within coral reefs.
	Needham's Point, Barbados.	
	Pelican Island.	Shallow water.
	Ensenada Honda, Culebra, Porto Rico.	
	Caracas Bay, Curaçao.	Under stones at the shore.
typa H. M.-Edw. 1837	Erythraea	
	Musha Islands; Obock; Djibouti.	
	Tanga, East Africa.	
	Goidu, Goifurfehendu Atoll (Maldive Archipelago.	Between tide-marks.
	Pulu Weh.	
	Off Labuan Pandan, Lombok.	Coral reef; 10.
	Sailus ketjil, Paternoster Islands	Shore.
	Off Seba, Savu.	Reef.
	North coast of Adonara.	17
	Kambarigi-bay, Tanah Djampeah.	Shore.
	Ternate.	
	Off Atjatuning, west coast of New Guinea	Reef.
	Sariba, British New Guinea.	
	New Zealand.	
	New Ireland.	
	Rotuma.	
	Funafuti.	
	Savaii, Samoa Islands.	
	Yaeyama Island.	
	Kagoshima.	
	Gulf of California.	

SPECIES	HABITAT	DEPTH IN FATHOMS
	IV. Genus Upogebia Leach 1814.	
	Subgenus Upogebia Leach 1814.	
affinis (Say) 1817	Long Island Sound to Sarasota Bay, Florida	
	Charleston	
	Pelican Island, Barbados	Shallow water
	Mamanguape stone reef, Brazil	
	Parahyba River, Brazil	Mangroves
	Maceio coral reef, Brazil	
africana (Ortm.) 1894.	Port Elizabeth	Probably identical with *Upog.* (*Upog.*) *capensis* (Krauss)
Balssi de Man 1927.	Sherm Scheikh, Red Sea	
	Persian Gulf between 25° 10′ Lat. N., 55° 10′ Long. E. and 24° 55′ Lat. N., 54° 40′ Long. E.	10—15 in pearl-oyster-banks
capensis (Krauss) 1843.	Lüderitz Bay	
	Table Bay	
	Gordon's Bay, False Bay	
	Simon's Bay	From stomach of *Scyllium*
	Zwartkops River, Algoa Bay	
	In some of the "Vleis", or saltwater lakes of Cape Colony	
carinicauda (Stimps.) 1860 . . .	Hongkong	
	Elphinstone Island, Mergui Archipelago	
	Luzon	
	Anchorage of Labuan Pandan, Lombok	10
	Anchorage off Seba, Savu	Reef
	Haingsisi, Samau Island, Timor	Shore
	Taruna-bay, Great-Sangir-Island	Reef
	Amboina	Reef
	Damar	Reef
	Saleyer-anchorage	Reef
	Torres Straits, Thursday Island	Beach
	Samoa Islands	
ceratophora de Man 1905. . . .	Bay of Nangamessi, Sumba	Up to 20
	Anchorage off Seba, Savu	Up to 15
Danai (Miers) 1876.	Bay of Islands, New Zealand	
	Auckland Harbour, Plimmerton	
	Cook Straits	
	Stewart Island	
	South side of Davis Straits!	
fallax de Man 1905.	Haingsisi, Samau-Island	20
gracilipes de Man 1927.	Adriatic (Servola near Triest, Pirano)	
heterocheir Kemp 1915	Chilka Lake	
	Tale Sap, on the east coast of Peninsular Siam	
hirtifrons (White) 1847.	South Seas (Antarctic Expedition)	

SPECIES	HABITAT	DEPTH IN FATHOMS
	Auckland and Manukau Harbours	
	Kenepuru (New Zealand)	
Issaeffi (Balss) 1913	Wladiwostok	
littoralis (Risso) 1816	Black Sea	0,8—1,1, argillaceous bottom
	Adriatic	
	Mediterranean (Nice, Naples, Messina)	
	Coast of Portugal	
	Southwest coast of France	
littoralis G. O. Sars 1884 . . .	Norway	
longipollex (Streets) 1871	Isthmus of Panama	
major (de Haan) 1849.	Japan: Bay of Tokio, Kanagawa, Yokohama, Sagami Bay, Katzura and Kada Bay, Hiroshima, Tsu (Ise), Kiu, Province of Bingo	
monoceros de Man 1905.	Lat. 7° 42′ S., long 114° 12′.6 E.	
	Anchorage off Djangkar (Java)	5
neglecta de Man 1927.	Port Stephens	
Osiridis Nobili 1904.	Red Sea, Djibouti, Aden	
pseudochelata Tatt. 1921	Suakin Harbour, Lat. 19° 8′ N.	
Pugettensis (Dana) 1852.	From south-eastern Alaska to San Quentin Bay, Lower California	
	Puget's Sound	
	Cape Fox, Alaska	
pugnax de Man 1905	Sapeh-bay, east coast of Sumbawa	Up to 20
Simsoni (G. M. Thomson) 1892	East coast of Tasmania	
	Western Port, Victoria	Below low water mark
spinifrons (Haswell) 1882. . . .	Port Stephens	8
spinigera (S. J. Smith) 1871 . .	Gulf of Fonseca	
	Fernando Noronha	
stellata (Montagu) 1808	South-west coast of Norway	
	Bohuslån	
	Kattegat	
	Coast of East Friesland	
	Heligoland	
	Coasts of England	
	Moray Firth, Aberdeen	
	St. Andrews	
	Coast of Northumberland and Durham	
	Salcombe Estuary	
	Near the mouth of the Yealm	
	Plymouth	
	Helford	Boring at low-water mark
	Falmouth	In stomachs of various fish
	Southern part of Deepwater channel	
	Coast of Belgium, North-Hinder	
	The whole west coast of France	
	Roscoff	
	Channel Islands	
subspinosa (Stimps.) 1860	Simon's Bay, Cape of Good Hope	8

SPECIES	HABITAT	DEPTH IN FATHOMS
Talismani Bouv. 1915	Off Cape Blanco, west coast of Africa	66
sp. Borradaile 1904	Mulaku Atoll	30
sp. *α* de Man 1927	Fau-anchorage and lagune, west coast of Gebé-island	Reef
sp. *β* de Man 1927	Waru-bay, north coast of Ceram	Reef
	Subgenus **Calliadne** Strahl 1861.	
ancylodactyla de Man 1905	Haingsisi, Samau-Island, near Timor	Shore
ancylodactyla de Man var. *amboinensis* de Man 1888	Amboina	
	Ternate	
Bowerbankii (Miers) 1884	Fremantle, South-west Australia	
cargadensis Borr. 1910	Cargados Carajos	30
	? Port Jackson	In the interior of sponges
Darwinii (Miers) 1884	Port Darwin, North Australia	12
	Amboina	Reef
	Singapore	
	Pulau Bidan, Penang	
	Elphinstone Island, Mergui Archipelago	
	South of Adam's Bridge	4 to 40
	Muttuvaratu Paar	6 to 9
	Rameswaram, Tuticorin, Cheval Par	In sponges
	Saya de Malha Bank	55
	Obock	
	Aden	
	Perim	
deltaura (Leach) 1815	West coast of Sweden	10
	Coast of England, Moray Firth	
	West and south coast of Ireland	From littoral zone down to about 40 fathoms
	Heligoland	
	Boulogne	
	Marseilles, Gulf of Tarente	
	Adriatic	72
furcata (Aurivillius) 1898	Bibundi, Cameroon	In the river, in small putrefied pieces of wood
hexaceras (Ortm.) 1894	Thursday Island	
	South of Salawatti Island, Lat. 1°42′5 S., long 130°47′.5 E.	17
	Persian Gulf	4—15
nitida (A. M.-Edw.) 1868	Cape-Verde Islands	
	St. Vincent, San Thomé	
octoceras Nobili 1904	Obock, Perim, Aden	
octoceras Nobili var. *australiensis* de Man 1927	Port Jackson	In the interior of sponges
operculata W. L. Schmitt 1924	Okra Reef, Barbados	
	St. Thomas, Savanah Passage	
rhadames Nobili 1904	Souakim	In sponges
	Massaouah, Djibouti	
rugosa (Lockington) 1878	Port Escondido, Gulf of California	

SPECIES	HABITAT	DEPTH IN FATHOMS
Savignii (Strahl) 1861	Egypt. Suez, Lat. 28° N.	
	Berenice, Red Sea	
	Khor Dongonab. Lat. 21° 11′ N. to Lat. 20° 50′ N.	
	Suakin Harbour, Lat. 19° 8′ N.	In sponges
	Massaouah, Djibouti	
	South Africa, Lat. 33° 9′.30″ S., long. 28° 3′.00″ E.	
sp. γ de Man 1927	San Thomé	
	V. Genus **Gebicula** Alcock 1901.	
exigua Alcock 1901	Andaman Sea.	265
Hupferi Balss 1916	Fernando Po.	6
	Spanish Guinea.	6
	VI. Genus **Bigea** Nardo 1847.	
tipica Nardo 1847	Adriatic, near Venice.	In the sea.
	VII. Genus **Ctenocheles** Kishinouye 1925.	
Balssi Kishinouye 1925	Ohsu, near Kashiwasaki, Niigata-Ken (Japan).	Probably from deep water.
	VIII. Genus **Glypturus** Stimps. 1866.	
acanthochirus Stimps. 1866 . .	Florida keys.	
	Tortugas.	
	Barbados.	From coral head
Branneri Rathb. 1900.	Mamanguape, Brazil.	Stone reef
	Pelican Island, Barbados.	Shallow water
	Hucares, Porto Rico,	
	Curaçao.	Shallow water (1)
grandimana (Gibbes) 1850 . . .	Key West.	
	Kingston.	
	IX. Genus **Callianassa** Leach [1]).	
	Subgenus **Calliactites** Borr. 1903.	
caecigena Alc. and Anders. 1894	Bay of Bengal, off Ceylon.	200—350
goniophthalma Rathb. 1902. . .	Clarence Strait, Alaska.	322
	Off Point Conception, California.	278
lignicola Alc. and Anderson 1899	Andaman Sea.	185 and 244

1) *Call. occidentalis* Bate 1888, taken by the "Challenger" off Sombrero Island, West-Indies, at a depth of 450 fathoms, of which only the larger cheliped and *Call. celebica* de Haan, of which only the mouth-organs are known, are not inserted in this List.

SPECIES	HABITAT	DEPTH IN FATHOMS
modesta de Man 1905	Bay of Bima, near south fort	30
	Lat. 0° 58'.5 N., long. 122° 42'.5 E. West of Kwandang-bay-entrance	40
	Lat. .5° 40' S., long. 132° 26' E.	170
	Elat, west coast of Great-Kei-island	15—170
rotundicaudata Stebbing 1902 .	St. Francis Bay, South Africa Lat. 34° 2'.45" S., long 25° 10'.00" E.	30—34
	Cheval Paar, Ceylon	6.5—13
secura Lanchester 1901	Kota Bharu, Kelantan	
sp. de Man 1928.	Off Dongala, Palos-bay, Celebes	20
	Subgenus **Cheramus** Bate 1888.	
Batei Borr. 1903	Lat. 18° 24' N., long. 63° 28' W., off Sombrero Island, West-Indies	450
Calmani Nobili 1904	Obock	
indica de Man 1905	Lat. 6° 59' S., long. 115° 24'.7 E., Bay of Kankamaraän, South coast of Kangeang	Reef
intermedia de Man 1905	Lat. 7° 46' S., long. 114° 30'. 5 E.	18
joculatrix de Man 1905.	Lat. 7° 25' S., long. 113° 16' E. Madura-Strait	31
	Lat. 7° 46' S., long. 114° 30'. 5 E.	18
	Lat. 8° 44'.5 S., long. 116° 2'. 5 E. Bay of Labuan Tring, west coast of Lombok	10—15
	Bay of Bima, near south fort	7—17
	Bay of Nangamessi, Sumba	Up to 20
	Makassar and Surroundings	Up to 17
	Lat. 0° 58'. 5 N., long. 122° 55' E., Kwandang-bay-entrance	41
	East side of Pajunga Island, Kwandang-bay	17
	Saleyer-anchorage and Surroundings including Pulu Pasi Tanette, near the North point of Saleyer-island	Up to 20
	Lat. 5° 40' S., long. 132° 26' E.	170
	Lat. 8° 27' S., long. 122° 54'. 5 E.	135
Jousseaumei Nobili 1904	Red Sea, Djibouti, Perim Bay of Tadjourah	
lobetobensis de Man 1905	Lat. 8° 27' S., long. 122° 54'. 5 E.	135
mauritiana Miers 1882	Mauritius	
minima Rathb. 1901. . . ? . . .	Porto Rico	161 to 172, 25 to 30
minor Gourret 1888	Gulf of Marseilles	16
	Southern Adriatic	
	Aegean Sea	50
moluccensis de Man 1905	Amboina	Reef
orientalis (Bate) 1888	Lat. 9° 59' S., long. 139° 42' E. Arafura Sea	28
pachydactyla A. M.-Edw. 1870	Cape Verde Islands	
praedatrix de Man 1905	Lat. 4° 20' S., long. 122° 58' E. Between Islands of Wowoni and Buton; northern entrance of Buton Strait	41 - 51

SPECIES	HABITAT	DEPTH IN FATHOMS
propinqua de Man 1905.	Lat. 0° 58′.5 N., long. 122° 55′ E. Kwandang-bay-entrance	40
pugnatrix de Man 1905.	Lat. 7° 46′ S., long. 114° 30′.5 E.	18
pygmaea n. sp.	Ambon-anchorage	30
Sibogae de Man 1905	Lat. 7° 46′ S., 114° 30′. 5 E.	18
subterranea (Montagu) 1808. . .	Coast of Devon	In subterranean passages
	Salcombe	At low water spring tides digging in the mud
	Off Rame Head near Plymouth	In deep water on muddy bottoms
	Bengasi, north coast of Africa	
	Subgenus **Trypaea** Dana 1852.	
affinis Holmes 1900	From Catalina Harbor to San Diego, California	
amboinensis de Man 1888. . . .	Amboina	
	Off Lirung, Salibabu-Island	Reef
australiensis Dana 1852.	District of Illawarra, New South Wales	Along shores
	Coast of Victoria	Burrows in muddy flats
Bouvieri Nobili 1904	Djibouti	
brachyophthalma A.M.-Edw.1870	Chiloe Islands	
californiensis Dana 1854	From Mutiny Bay, Alaska, to mouth of Tia Juana River, San Diego County, California	
californiensis Dana var. *japonica* Bouv. 1901.	Japan	
ceramica Fulton and Grant 1906	Port Phillip and Western Port	Burrows in muddy flats
chilensis A. M.-Edw. 1860 . . .	Chile	
cristata Borr. 1910.	Salomon Atoll, Chagos Archipelago	
Filholi A. M.-Edw. 1878	Stewart Island	
	Oamaru, New Zealand	
	Timaru, New Zealand	
gigas Dana 1852.	Puget Sound	
	Gulf of the Farallones, California	21
Gravieri Nobili 1905	Obock	
	Harmil Island, Red Sea	
Harmandi Bouv. 1901.	Japan	
	Province of Bingo, Japan	
	Nemuro, Hokkaido	
italica Parisi 1915	Gulf of Naples	
japonica Ortm. 1891.	Bay of Tokio	
	Province of Bingo, Japan	
	Hakodate, Japan	
longimana Stimps. 1857.	From Vancouver Island, British Columbia to San Quentin Bay, Lower California	
	Vancouver Island	
	Fort Steilacoom, Puget Sound	
	Shoalwater Bay	
	San Francisco	

SPECIES	HABITAT	DEPTH IN FATHOMS
	Santa-Rosa Island, one of the Santa-Barbara group	
	San Pedro	
	San Diego	
	San Quentin Bay	
maldivensis Borr. 1904	Hulule, Male Atoll	Taken between tide-marks
	Gulf of Manaar	
petalura Stimps. 1860	Simoda, Japan	
Rochei Bouv. 1895	Lower California	
truncata Giard and Bonnier 1890	Gulf of Naples	
uncinata H. M.-Edw. 1837 . . .	Island of Quehuy, off Chiloë	
	Puerto Montt, province of Llanquihue, South Chile	
	Tumbes, near Lago Llanquihue	
	Talcahuano, Chile	
	Capon, Peru	Living in the muddy sand of the inside beach
sp. Rathbun 1906	Honolulu	Reef
	Subgenus **Callichirus** Stimps. 1866.	
aequimana Baker 1907	Kingston, South Australia	
armata A. M.-Edw. 1870. . . .	Fiji Islands	
	Ternate	
articulata Rathb. 1906	Vicinity of Modu Manu, Hawaiian Islands	23 to 33
	Sunday Island, Kermadec Islands	From a rock-pool
assimilis n. sp.	Amboina	
atlantica Rathb. 1926	From the coast of the Southern States north to Long Island Sound	This species inhabits muddy shores and bottoms, in shallow water, a burrowing species.
	Woods Hole and vicinity	
	Weepeckets, Buzzards Bay, Vineyard Sound, Naushon	
audax de Man 1911.	Straits of Malacca	
Bocourti A. M.-Edw. 1870 . . .	Union Island, Pacific Ocean	
brevicaudata A. M.-Edw. 1870.	Zanzibar	
Coutierei Nobili 1904	Perim	
	Djibouti	
	Aden	
Eiseni (Holmes) 1904	Lower California	
Grandidieri Cout. 1899	River Mahanara, north-east coast of Madagascar	At several hundreds of meters distant from the mouth, where the water becomes brackish only at spring-tide. Lives in the sand.
guineensis de Man 1928	Prampram, Gold coast	5
Kraussi Stebbing 1900	Gordon's Bay, Cape of Good Hope	A little below high water mark.
laticauda Otto 1828.	Mediterranean (Nice, Naples)	On the soft bottom of the sea.
	West coast of France (Jersey)	
	?Irish Sea, west coast of Ireland	

SPECIES	HABITAT	DEPTH IN FATHOMS
longiventris A. M.-Edw. 1870 .	Coast of Martinique	
longiventris A. M.-Edw. var. *Borradailei* de Man 1928 . .	Goidu, Goifurfehendu Atoll (Maldive Archipelago)	Between tide-marks
madagassa Lenz and Richters 1881	Nossibé, near Madagascar	
major Say 1818	Bay shore of the river St. John in East Florida	Taken in the sand, 18 inches below the surface, near low water mark; its holes are usually about one foot in depth.
	Georgia	
	Coast of South Carolina and Charleston Harbour	
	Beaufort, North Carolina	
marginata Rathb. 1901	Mayaguez Harbor, Porto Rico	22 to 33; 75 to 76; 161 to 172
	Off Aguadilla, Porto Rico	137
Martensii Miers 1884	Mauritius	
	Buntal [1])	
maxima A. M.-Edw. 1870 . . .	Siam	A single chela of gigantic dimensions was obtained in Siam, many miles from the sea. On this chela the species was established by A. MILNE-EDWARDS.
	Nalbano Island and Barhampur Island, Chilka Lake	
	Perhaps also in one of the backwaters in the vicinity of Madras	This species lives in the Chilka Lake in mud mixed with a considerable proportion of sand.
mucronata Strahl 1861	Luzon, Philippine Islands	
	Amboina	Reef
	Waru-bay, north coast of Ceram	Reef
	North-west New Guinea	
	Off Sawau, Siau-island	Reef
	Off Beo, Karakelang-islands	Reef
	Male Atoll, Maldive Archipelago	
	Djibouti, Perim	
	Red Sea	
Novae-britanniae Borr. 1899 . .	New Britain	
	Goidu, Goifurfehendu Atoll (Maldive Archipelago)	Taken between tide-marks
Novae-britanniae Borr. var. de Man 1928	Locality unknown	
Pestae de Man 1928.	West coast of France (St. Malo)	
	Mediterranean (Naples, Sicily)	
	Adriatic (Venice, Rovigno, Pirano, Lesina)	
	?Black Sea	
placida de Man 1905	Off Seba, Savu	Reef
	Off Laiwui, coast of Obi Major	Reef
Rosae Nobili 1904	Red Sea	

1) The specimen from Buntal, coast of Borneo, that was referred to *Call. Martensii* Miers by W. F. LANCHESTER (in: Annals and Mag. Nat. Hist. Ser. 7, Vol. VI, September 1900, p. 261, Pl. XII, figs. 4, 4*a*), does perhaps not belong to this species.

SPECIES	HABITAT	DEPTH IN FATHOMS
tridentata von Martens 1868 . .	Java. Ceylon.	
Turnerana White 1861	Cameroon. Robertsport, Liberia [1]).	In fresh-water
vigilax de Man 1916	Amboina.	
	Subgenus **Scallasis** Bate 1888 [2]).	
Amboinae (Bate) 1888	Amboina.	

Subfamily CALLIANIDEINAE n.

Callianidea H. M.-Edw.

The genera *Metaxius* Bouv. and *Meticonaxius* de Man that are probably identical, and *Callianidea* H. M.-Edw. differ from the other *Callianassidae* by the carapace being destitute of the *linea thalassinica*, the genus *Callianidea*, however, may be distinguished from all the other *Callianassidae* by the 2nd—5th pairs of pleopods, of which the margins, instead of being fringed with small hairs or cilia, have these modified into soft and flexible, articulated, membranous filaments. Like in the genus *Metaxius* Bouv. there are epipodites on the legs of the 1st to 4th pair.

The genus *Callianidea* which in its general appearance resembles *Callianassa*, is probably only represented by two species, *Call. typa* H. M.-Edw. and *Call. laevicauda* Gill. NOBILI has shown in 1906 (Faune Carcinologique de la Mer Rouge, Décapodes et Stomatopodes, p. 114), that *Call. mucronata* Kossmann from the Red Sea should be considered as identical with *Call. typa*, and *Call. elongata*, which was established by GUÉRIN in 1832 on a specimen, only three centimeters long, from the Mariannes, is also generally considered as being the same species, in which case GUÉRIN's name ought to have the priority.

Callianidea typa H. M.-Edw. is distributed, in the whole Indopacific, from the Red Sea and East Africa thoughout the Indian Ocean and the whole Indian Archipelago to New Zealand (as recorded by J. E. V. BOAS, Studier over Decapodernes Slaegtskabforhold, København 1880, p. 108 (86), footnote), New Ireland, Rotuma, Funafuti, the Samoa Islands and Japan. LOCKINGTON records this species even from the Gulf of California.

The other species is *Call. laevicauda* Gill, which is easily distinguished by the cylindrical filaments, with which the pleopods of the 2nd—5th pairs are fringed and which are composed of three joints placed end to end and not branching as in *Call. typa*. *Call. laevicauda* Gill is known from the West-Indies and has been recorded from Barbados, Pelican Island, Porto Rico and Curaçao. With this species *Call. Steenstrupii* Boas, likewise from the West-Indies, is probably identical (J. E. V. BOAS, l. c.).

1) According to a specimen in the Leiden Museum, that was identified by me as belonging to *Call. Turnerana* White.

2) *Callianassa* (?*Scallasis*) *coeca* Balss, which was captured in 1899 by the "Valdivia" at a depth of 220 fathoms off Dar es Salam, should in my opinion be considered as identical with *Meticonaxius monodon* de Man (H. BALSS, in: Wissenschaftl. Ergebn. der Deutschen Tiefsee-Expedition, Bd. XX, Heft 4, Jena 1925, p. 212, fig. 16).

The species of *Callianidea* are found in shallow water, between tide-marks, under rocks or within coral reefs.

1. *Callianidea typa* H. M.-Edw. Pl. I, fig. 3—3*f*.

Callianidea typa H. Milne-Edwards, Hist. Nat. des Crustacés, II, 1837, p. 320, Pl. 25 bis, figs. 8—14.
Callianidea typus J. E. V. Boas, Studier over Decapodernes Slaegtskabsforhold, København 1880, p. 108 (86), foot-note, in: Vidensk. Selsk. Skr., 6. Raekke, naturvidenskabelig og mathematisk Afd., I. 2.
Callianidea typa J. G. de Man, in: Abhandl. Senckenb. Naturf. Gesells. Bd. XXV, Heft III, Frankfurt am Main 1902, p. 751.
Callianidea typa G. Nobili, Faune Carcinol. de la Mer Rouge, Décapodes et Stomatopodes, Paris 1906, p. 113, in: Annal. des Scienc. Nat., 9e Série, Zool. T. IV.
Callianidea typa H. Balss, Ostasiatische Decapoden II. Die Natantia und Reptantia. München 1914, p. 90, in: Abhandl. der Math.-phys. klasse der K. Bayer. Akad. d. Wiss. II Suppl. Bd. 10. Abhandl.
Callianidea mucronata R. Kossmann, Zoolog. Ergebnisse einer Reise in die Küstengebiete des Rothen Meeres. Zweite Hälfte. Erste Lief. Leipzig 1880, p. 80 (teste G. Nobili, l. c.)

Stat. 34. March 27. Anchorage off Labuan Pandan, Lombok. 18 m. Coral reef. 3 males.
Stat. 37. March 30/31. Sailus Ketjil, Paternoster Islands. Shore. 1 male and 2 females, one of which with eggs.
Stat. 58. April 25. Anchorage off Seba, Savu. Reef. 1 young female without eggs.
Stat. 61a. May 2. North coast of Adonara. 31 m. Bottom coral, 1 female without eggs, of medium size.
Stat. 64. May 4/5. Kambarigi-bay, Tanah Djampeah. Shore. 1 adult male.
Stat. 169. August 23/25. Anchorage off Atjatuning, west coast of New Guinea. Reef. 1 young female without eggs.

The adult male from Stat. 64 is 66 mm. long, twice as long as that which I have described (l. c.) in 1902; the carapace, measured in the middle line, is 15 mm. long, the abdomen 51 mm., i. e. somewhat more than 3-times as long as the carapace. The carapace is anteriorly strongly inclined downwards and ends in the rostrum which is obtuse and so short (Fig. 3, 3*a*), barely reaching to midway between the base of the eyestalks and the eyes, that its existence has even been denied by Milne-Edwards. The eyestalks, a little shorter than the first joint of the antennular peduncle and as long as broad at their base, have obtuse and flattened apices; the semiglobular, black pigmented eyes are small, prominent and situated on the outer border of the stalks, nearer to the apex than to the base.

Internal antennae as long as the carapace; second joint barely shorter than first and half as thick as long; third joint, distinctly longer than first, once and a half as long as second. Antennular flagella nearly of equal length, twice as long as the peduncle; the upper flagellum, composed of 46 segments, slightly broadens until at one-fifth its length from the extremity, i. e. until the 30th segment, beginning from the base, and hence gradually tapers to the end. The lower flagellum that carries long, ciliated hairs, is composed of 33 segments.

External antennae 29 mm. long, twice as long as the inner and as the carapace. The slender peduncle, 8 mm. long, extends by one-fourth its penultimate joint beyond the antennular peduncle; the penultimate joint is half as long as the whole peduncle, one and a half times as long as the terminal joint and twice as long as the third joint of the peduncle of the inner

antennae. There is a very small, pointed scaphocerite, half a millimeter long, visible on the distal end of the third joint; this rudimentary scale has already been mentioned by Boas (l. c.).

The larger cheliped on the right side is wanting. The thoracic legs are already described in my work of 1902, it will therefore suffice to mention the measurements, because the described specimen, also a male, was only half as long as that from Stat. 64. The merus of the smaller cheliped is 6,5 mm. long and 2,66 mm. broad in the middle; the carpus, 8 mm. long and 1,9 mm. broad distally, is little more than 4-times as long as broad. Chela 10,5 mm. long, palm 7,25 mm. long and 2 mm. broad. Dactylus a little longer than the fixed finger, its tip is strongly curved downward and its cutting-edge is entire, unarmed. The straight fixed finger bears a larger conical tooth just in the middle of the cutting-edge and this tooth is half as high as the finger at this place; between the tooth and the articulation are eight, very small, sharp teeth, all of the same size and considerably smaller than the large tooth; between the latter and the tip, finally, one observes about a dozen teeth, that are also smaller than the large tooth and that are of unequal size, three larger teeth alternating with very small ones, and these three are placed closer by the large tooth than by the tip. Both the upper and the lower border of carpus and chela are fringed, at the inner side, with long hairs, that are distinctly arranged in transverse tufts; on the outer side of the palm are four tufts of hair in a longitudinal series parallel with and not far from the upper border, a fifth near the middle of the lower. The fingers are hairy both on their outer and inner side.

The chela of the 2nd legs is 6 mm. long, the palm 2,4 mm. long and just as broad. The lower finger bears on its cutting-edge a row of 25 horny teeth that extends from near the articulation to the horny tip; they are situated close by one another and become gradually somewhat larger distally. The other finger bears 23 similar teeth on the distal half of its cutting-edge. Not only the lower, also the upper border of the carpus is fringed with setae.

The legs of the 3rd pair are imperfectly subcheliform, the broadened propodus being somewhat produced at the distal end of its lower border and terminating in an obtusely rounded, fixed finger, that bears on the tip a spine long 0,4 mm. The strongly compressed propodus, measured between the tip of this fixed finger and the carpal articulation, appears to be 4,8 mm. long and it shows its greatest width of 2,8 mm. not far from the carpus. This joint is comparatively less broadened than in the male, 30 mm. long, described in 1902. Dactylus 2,1 mm. long and 0,92 mm. broad at its base.

As regards the legs of the 4th pair, that are described by Milne-Edwards as "presque cylindriques", I would remark that the carpus is almost cylindrical, little broader than thick, but that the merus and especially the propodus are distinctly compressed. The propodus is 5 mm. long and 1,5 mm. broad in the middle, comparatively less broad in proportion to its length than in the young male of 1902. The hairs of the brush on the distal half of the lower margin are partly beautifully bipinnate, partly very shortly ciliate; the upper border carries a tuft of plain hairs at the distal end and a smaller one just behind it. Dactylus 2,8 mm. long, curved at its base.

The propodus of the subcheliform 5th pair is 5,2 mm. long until the tip of the fixed finger, 1,28 mm. broad distally, 0,92 mm. in the middle and 1,1 mm. near the carpal articulation; the immobile finger bears 7 or 8 horny teeth. The curiously contorted dactylus is somewhat

longer than 2 mm. The distal end of the propodus is concealed by a brush of stiff setae, most of which are short-ciliate, the others bipinnate.

The largest specimen, a male, from Stat. 34 is 47 mm. long, the carapace measuring 10,25 mm., not yet one-fourth the length of the body; both chelipeds of 1st pair are present, the larger on the left side. In other specimens of this collection the larger cheliped is on the right side. The slender ischium of the larger cheliped, 5,5 mm. long, is broadened on its distal third part and, near the articulation of the merus, 2 mm. broad, at the base, however, 1,25 mm.; the lower border is finely serrate. The merus which is 6,5 mm. long and 3,5 mm. broad in the middle, is trilateral; its inner surface is flattened, the slightly convex upper side and the more flattened lower make a right angle with one another and the lower side is even somewhat concave both proximally and distally. The merus is strongly constricted near the articulation with the ischium and its sharp, lower edge is fringed with hairs distally. The carpus is very short, 2,25 mm. long in the middle, but 3,5 mm. when measured along its somewhat sinuate, upper margin; it is 4,8 mm. broad or high distally, so that the carpus is twice as wide as long in the middle; it is rather strongly convex transversely, its lower angle is sharp and somewhat curved inward. The chela is 14 mm. long, almost once and a half as long as the carapace; the palm is 8 mm. long and 6 mm. broad, distinctly longer than the fingers. The lower edge is serrated at the inner side, from the proximal end to the middle of the immobile finger, and bears 25 or 26 small, moderately sharp teeth; both the upper and the lower margin are fringed on the inner side with hair. The dactylus, slightly longer than the immobile finger, is regularly curved downward; its cutting-edge bears a small conical tooth just beyond the middle and between it and the articulation four other teeth, of which the second is larger, the others smaller than the conical tooth; between this tooth and the tip the finger is very finely crenulate. At the inner side the lower border of the dactylus appears distinctly serrate on its distal half and there are two very small tubercles not far from the articulation. The nearly straight, fixed finger bears on its proximal half four or five conical teeth, the first very small, the following gradually larger, so that the fourth, on the middle of the finger, is even larger than the teeth of the dactylus; between the fourth tooth and the tip one observes a dozen very small teeth. The outer side of this finger bears, just below and parallel with the larger proximal teeth, a row of 10 or 11, very small, rounded granules and the upper border of the inner side presents small rounded tubercles or granules from the articulation to the tip. Both the upper border of the dactylus and the lower of the immobile finger are fringed on the outer and on the inner side with hairs and as usually the fingers are hairy near the teeth. The outer surface of the palm is somewhat convex transversely, a little also longitudinally and there are a few tufts of setae near the upper border and distally; inner surface also somewhat hairy.

The pleopods (Fig. 3*d*) of the 1st abdominal segment are in the adult male, long 66 mm., from Stat. 64 uniramous, 6,5 mm. long and two-jointed. The peduncle, 2,4 mm. long, thickens somewhat distally; long setae that are somewhat longer than the peduncle itself, are implanted at the distal end; the terminal joint, not yet twice as long as the peduncle, is broadened proximally and this broadened part which is distally rounded on the inner side, is produced at the outer side in a longer, slender, tapering filament.

the lateral margins of which are fringed with long, ciliated hairs; the obtuse distal end of the broadened proximal part carries similar long hairs as exist at the distal end of the peduncle. These long setae are apparently not ciliate, but they end all in a tuft of fine hairs; it remained doubtful, however, whether these tufts are adventitious or actually proper to the animal, because they are wanting in younger individuals.

The pleopods (Fig. 3*e*) of the 1st abdominal segment in the male, long 47 mm., from Stat. 34 are 4 mm. long and uniramous; they are spatulate, but their outer border is prolonged in a finger-shaped filament, twice as long as broad and measuring one-sixth the whole length of the pleopod. The greatest width of these appendages, a little beyond the middle, is about one-sixth their length; the distal half of the inner margin and the blunt tip of the spatulate part are fringed with long hairs, that are more than 2 mm. long. In another male, long 40 mm., from the same Station the pleopods of the 1st segment resemble those of the preceding specimen. They are 2,8 mm. long, the greatest width of the spatulate part is, however, one-seventh their length and the finger-shaped process, 0,24 mm. long, is considerably shorter. Not only the slight differences between this male and the preceding one, but also those exhibited by the pleopods of the adult male from Stat. 64 are, of course, depending on the different age of these specimens.

The egg-laden female from Stat. 37 is 31 mm. long. The numerous eggs are ovate, 0,75 mm. long, 0,5 mm. broad, rounded at both extremities. The pleopods of the 1st abdominal segment of this female (Fig. 3*f*) are uniramous, slender filaments, consisting of a strip-like peduncle, long 1,1 mm., and a narrow foliaceous ramus, that is nearly twice as long and scythe-shaped, being broadened at its base. The margins of the peduncle and of the terminal joint are fringed with ciliated hairs, there is a tuft of long, outstanding, oviferous setae at the distal end of the peduncle and another on the terminal joint, somewhat less distant from the peduncle than the latter is long.

The pleopods of the four following segments are in the male equally shaped, each consisting of an exopodite and an endopodite that is divided, a little beyond the middle, in a larger branch and a smaller one on the inner side. The smaller branch on the inner side is apparently homologous with the stylamblys of *Callianassa*. In the adult male from Stat. 64 this small inner plate is 1,7 mm. long, the obtuse apex and the outer margin are fringed with long setae, that are 3—4 mm. long and that end in a tuft of fine hairs, similar to those with which the pleopods of the 1st pair are supplied. As regards the slender filaments with which the two other plates are fringed, I would remark that they are not bifurcated two times, as says Milne-Edwards, but three or four times, sometimes even rarely a fifth time; often a terminal filament is not bifurcated or appears two- or three-jointed. Similar remarks have been made by Kossmann about his *Callianidea mucronata* from the Red Sea (Zoolog. Ergebn. einer Reise in die Küstengebiete des Rothen Meeres, IIe Hälfte, 1880, p. 80), this species is, however, identical with *Call. typa*.

In the adult male from Stat. 64 the filaments of the four posterior pairs of pleopods are beset with innumerable individuals of a sessile Infusorium. In the female these pleopods are apparently structured in the same manner as in the male.

In younger specimens the rostrum is comparatively longer and sharper, so e. g. in

the third specimen from Stat. 34 (Fig. 3*b*, 3*c*). In this specimen, long 18 mm., the antennular flagella are composed of a smaller number of segments; the lower flagellum is composed of 16 segments, the upper of 21 and the 7th segment, counting from the tip, is the broadest, being 0,13 mm. long and 0,16 mm. broad, in a lateral view, the thickest segment being situated almost at one-fourth the length of the flagellum from the extremity. In this specimen the carpus of the smaller cheliped is 1,7 mm. long; the chela is 3,5 mm. long, the palm 2,4 mm. The carpus is much shorter than in older individuals, being only half as long as the chela and even shorter than the palm. The lower border of the larger chela is barely serrate and some teeth are not yet developed.

In the young female, long 36 mm., from Stat. 61*a* the carpus and the chela of the smaller (right) cheliped are of equal length, each measuring 4,7 mm.; the fingers are 1,7 mm. long.

In the egg-bearing female from Stat. 37 the fingers of the larger (right) cheliped are slightly longer than the palm. All these discrepancies are individual.

Distribution: Japan (Kagoshima), Yaeyama Island, New Ireland, Mariannes Islands, Rotuma, Funafuti, Samoa Islands, New Zealand, British New Guinea (Sariba), Ternate, Pulu Weh, Maldive Archipelago (Goidu, Goifurfehendu Atoll), East Africa (Tanga), Red Sea (Erythraea, Musha Islands, Djibouti, Obock). According to Lockington also in the Gulf of California.

Subfamily Upogebiinae Borr.

Upogebia Leach.

The genus *Upogebia*, that was founded in 1814 by W. E. Leach to receive the *Cancer Astacus stellatus* of Montagu, a fossorial Crustacean discovered by Mr. Gibbs in the King's-Bridge Estuary, contains at present nearly 40 species and is for convenience's sake subdivided into two subgenera *Upogebia* Leach s. s. and *Calliadne* Strahl; the subgenus *Upogebia* s. s. contains those species in which the immobile finger of the anterior legs is much shorter than the dactylus and in which the antero-lateral border of the carapace is armed with a small spine on a level with the eyes and just over the second antennae, the subgenus *Calliadne*, originally established by Strahl in 1861 as a proper genus for *Calliadne Savignii* of the Red Sea, those in which the anterior limbs are perfectly chelate, the dactylus being as long as the immobile finger, rarely a little longer, and in which there is no small spine on the curved edge of the frontal margin of the carapace behind the eyestalks. In *Upog. Danai* (Miers) and *Upog. Osiridis* Nobili, species in which the fixed finger is considerably shorter than the dactylus and which therefore are referred to the subgenus *Upogebia*, the small spine on the antero-lateral border of the carapace is wanting, in *Upog. longipollex* (Streets), however, the fixed finger is almost as long as the dactylus. It is therefore that in his valuable paper on the development of *Upogebia* this subdivision into two subgenera is no longer followed by Mr. G. E. Webb (in: Journ. Marine Biol. Assoc., New Series, Vol. XII, N° 1, Plymouth 1919, p. 83). Nearly one-third of the known species belong to the subgenus *Calliadne*, the rest to the subgenus *Upogebia*.

The coasts of Europe are inhabited by four, perhaps five species, of which only one belongs to the subgenus *Calliadne*. *Upog. stellata* (Montagu) has been recorded from the south-west coast of Norway, Bohuslän, the Kattegat, Heligoland, the coasts of East Friesland, Belgium, the Channel Islands and the whole west coast of France; it occurs also on the east coast of Scotland and the east and the south coast of England, but has not so far been recorded from the Irish coasts. The Black Sea, the Adriatic and the Mediterranean (Nice, Naples, Messina) are the habitat of *Upog. littoralis* (Risso), which has also been recorded from the coast of Portugal and the south-west coast of France; it occurs at small depths in holes and passages of the mud of the beach in which it burrows, conceals and hides itself; this species feeds on Mollusca, especially on the genera Modiola and Venus, the shells of which it opens with great adroitness. *Upog. gracilipes* de Man, described in 1927 in the "Capita Zoologica", has been found in the Adriatic, in the neighbourhood of Triest. *Upog. deltaura* Leach, that is referred to the subgenus *Calliadne* though the immovable finger is one-third shorter than the dactylus, has been observed on the west coast of Sweden at a depth of 10 fathoms, in the Moray Firth, on the west and south coasts of Ireland, where it occurs from the littoral zone down to about 40 fathoms and is of common occurrence on the coasts of Devonshire and Cornwall; it is known from Heligoland, Boulogne, is found very rarely in the Gulf of Tarente and has twice been captured in the Adriatic, namely one small specimen off the island of Cazza at a depth of 72 fathoms and another specimen in the southern part of this sea. In 1884 G. O. Sars has described the larval development of a species of this genus, that he referred to the mediterranean *Upog. littoralis*: according to Mr. G. E. Webb (l. c. p. 85) Sars's description should refer to neither of the British species [*Upog. stellata* (Mont.) and *Upog. deltaura* Leach], but to a different and perhaps purely Norwegian form. Unfortunately adult specimens of this doubtful species are not yet known.

Off Cape Blanco, midway between the Canaries and the Cape-Verde Islands, at a depth of 66 fathoms, *Upog.* (*Upog.*) *Talismani* Bouv. has been taken, a very spinose species, belonging to that small section of the genus which is characterized by the lower border of the rostrum being armed with one or more spines. The three other species that occur on the west coast of Africa north of the tropic of Capricorn and that all belong to the subgenus *Calliadne*, are *Upog. nitida* (A. M.-Edw.) from the Cape-Verde Islands and San Thomé, *Upog. furcata* (Aüriv.), discovered at Bibundi, Cameroon, in the river in small putrefied pieces of wood and finally a species also from San Thomé, closely related to *Upog. deltaura* Leach. Of this species only one specimen is known, which is described, together with *Upog. furcata*, in my work on 21 species of this genus, published in 1927 in Vol. II, Part 5 of the "Capita Zoologica", and of which the examination proved that it should probably be considered as a young stage of *Upog. deltaura* or a closely related form.

On the east coast of America only two species of this genus occur. *Upog. affinis* (Say), of the subgenus *Upogebia* s. s., has a wide range, extending from Long Island Sound to Sarasota Bay, Florida, it occurs in shallow water at Pelican Island, Barbados and is also known from the coast of Brazil between Lat. S. 6° and 10°, where it was found in the mangroves. Messr. W. P. Hay and C. A. Shore write about this crustacean that it "occurs in various parts of the harbor (at Beaufort, N. C.) in burrows which it digs to a depth of about a foot in

muddy sand between tide levels. The margins of Town Marsh, of Pivers Island, and the projecting shoal above the fish factory are favorable collecting grounds. In the latter locality an hour's work at low tide has brought to light as many as 50 specimens ranging from very young to full-grown individuals. Females carrying eggs may be collected at almost any time during the summer. A small percentage of the adults proved to carry a large isopod parasite (*Pseudione upogebiae* Hay) in the right or left branchial chamber" (The Decapod Crustaceans of Beaufort, N. C., and the Surrounding Region, Wash. 1918). The other species, *Upog. operculata* W. L. Schmitt, belonging to the subgenus *Calliadne*, differs, like also *Upog. rugosa* (Lock.), from all the other species of this subgenus by the telson presenting its greatest width at the posterior margin; this species is known from Okra Reef, Barbados and St. Thomas, Savanah Passage.

The shores of South Africa are inhabited by *Upog. capensis* (Krauss), that belongs to the subgenus *Upogebia* s. s. and that is distributed from Lüderitz Bay to the Zwartkop River, Algoa Bay: *Upog. africana* (Ortm.) from Port Elizabeth is no doubt identical with this species, as was already suggested by Balss in 1913. According to this author (in: Beiträge zur Kenntnis der Meeresfauna West-afrikas. Crustacea II. Hamburg 1916, p. 34) *Upog. capensis* lives in smooth channels the transverse section of which is circular and that extend in the rather solid mud below and between the layers of slate at neap-tide (schiefrige Felsplatten des tiefsten Ebbestrandes), this species is also very abundant in some of the "Vleis" or salt water lakes of the Cape Colony. It is in my opinion still doubtful whether *Upog. subspinosa* (Stimps.), of which a female was captured in Simon's Bay, Cape of Good Hope, at a depth of 8 fathoms in a sandy bottom, should be considered as a species distinct from *Upog. capensis* or not.

The great majority of the species of this genus are found on the coasts of the Indopacific Seas. Six species inhabit the Red Sea, of which three, *Upog. Osiridis* Nobili, *Balssi* de Man and *pseudochelata* Tatt., belong to the subgenus *Upogebia* s. s., the three others to the subgenus *Calliadne*. *Upog. Osiridis* Nobili is known from Djibouti and Aden, *Upog. octoceras* Nobili from Obock, Perim and Aden, while *Upog. rhadames* Nobili was taken at Suakim in sponges and at Massaouah. *Upog. pseudochelata* Tatt., remarkable by there being no prominent spines on any of the joints of the chelipeds, was collected by Mr. Cyril Crossland at Suakim Harbour, Lat. 19° 8′ N., in coral. *Upog. Savignii* (Strahl), that was figured on Plate IX, fig. 3 of Savigny's Description de l'Egypte, and that was erroneously referred by Audouin to *Gebia stellata*, inhabits the whole Red Sea from Suez to Djibouti, but was also taken off the coast of South Africa at Lat. 33° 9′.30″ S., long. 28° 3′.00″ E., i. e. near East London. *Upog.* (*Upog.*) *Balssi* de Man was captured by the Pola Expedition at Sherm Sheikh (Sinai Peninsula) and has been described in my *Upogebia*-paper (l. c. p. 43). *Upog. cargadensis* Borr. was dredged in 1905 by the Percy Sladen Trust Expedition in 30 fathoms at Cargados Carajos and is closely related to *Upog. Bowerbankii* (Miers) from Fremantle, South-west Australia: both belong to the subgenus *Calliadne*. Still two other species, also of the subgenus *Calliadne*, are found in the Indian Ocean. *Upog. Darwinii* (Miers) was first collected at Port Darwin, North Australia, at 12 fathoms and has afterwards been recorded from Amboina, where it lives on the reef, from Singapore, Pulau Bidan near Penang, the Mergui Archipelago, from near Ceylon where it inhabits sponges at 4 to 40 fathoms, from the Saya de Malha Bank at a depth of 55 fathoms and from the southern

extremity of the Red Sea (Obock, Perim, Aden). *Upog. hexaceras* (Ortm.), first recorded from Thursday Island, was collected by the "Siboga" at 17 fathoms south of Salawatti Island and occurs, according to NOBILI, also in the Persian Gulf in a depth of 4—15 fathoms. A remarkable species, distinguished from all the others by the legs of the 1st pair being subchelate in the male, monodactylous in the female and to which Dr. STANLEY KEMP has therefore given the name of *Upog. heterocheir*, is a permanent inhabitant of the Chilka Lake, but occurs also at Tale Sap, on the east coast of Peninsular Siam.

While *Upog. Darwinii* and *Upog. Bowerbankii* were respectively collected at the north and south-west coast, the east coast of Australia is inhabited by still three other species. *Upog. spinifrons* (Haswell) was collected at a depth of 8 fathoms at Port Stephens, New South Wales; it is a species armed with many spines and related to *Upog. Talismani* Bouv. from the west coast of Africa. The second is *Upog. neglecta* de Man, also from Port Stephens, while the third, considered by me as a variety *australiensis* of *Upog. octoceras* Nobili from the Red Sea, lives at Port Jackson in the interior of sponges. The east coast of Tasmania and Western Port, Victoria, are inhabited by *Upog. Simsoni* (G. M. Thomson), a species closely related to *Upog. Danai* (Miers), both belonging to the subgenus *Upogebia* s. s. and both distinguished by the lateral frontal lobes reaching about halfway to the point of the rostrum.

Two species, both pertaining to the subgenus *Upogebia* s. s., occur on the coasts of New Zealand, viz. *Upog. Danai* (Miers) and *Upog. hirtifrons* (White): of both species Professor CHILTON of Canterbury College, Christchurch, New Zealand, has published detailed descriptions, but, unfortunately, without figures. According to MIERS *Upog. Danai* should also occur on the south side of Davis Straits, but this habitat has not yet been confirmed, as far as I know.

Thanks to the investigations of the Siboga-Expedition eight species of the subgenus *Upogebia* and one of *Calliadne* are at present known to occur in the Indian Archipelago. *Upog. ancylodactyla* de Man lives in the shore at Haingsisi, Samau Island, near the south-western extremity of Timor, a variety *amboinensis* occurs at Amboina and Ternate. *Upog. carinicauda* (Stimps.), first discovered by the U. S. Expedition to the North Pacific at Hong Kong, occurs also in the Mergui Archipelago and was collected by the "Siboga" at seven various localities of the Indian Archipelago; this species, easily recognizable by the frontal border of the carapace being not tridentate and by the existence of a spine on the lower border of the propodus of the chelipeds at the base of the fixed finger, has also been recorded from Thursday Island, Torres Straits and from the Samoa Islands. Four very remarkable species are *Upog. fallax* de Man, *pugnax* de Man, *ceratophora* de Man and *monoceros* de Man, but it is a pity that only one specimen of each was collected, excepting two of *Upog. ceratophora*. *Upog. fallax*, distinguished by the long narrow uropods that are considerably longer than the telson, was captured at Haingsisi, Samau-Island at a depth of 20 fathoms. *Upog. pugnax*, in which the upper border of the propodus of the chelipeds is armed along its whole extent with five spines, occurs at 20 fathoms in Sapeh-bay, east coast of Sumbawa. *Upog. ceratophora* and *Upog. monoceros* differ from all other *Upogebiae*, excepting *Upog. affinis*, by the lower border of the rostrum being armed with a single spine; the former was captured in the Bay of Nangamessi, Sumba and in the anchorage off Seba, Savu, respectively at 20 and 15 fathoms, the latter in the anchorage of Djankar, Java, at 5 fathoms. On the west coast of Gebé-island, east of Halmahera the

"Siboga" has taken a specimen of a species, related to *Upog. Danai* (Miers); it remained doubtful whether this specimen should be considered as a young individual of this species or as a new form, therefore no name was given to it by the author. A similar uncertainty exists as regards a specimen collected by the "Siboga" on the north coast of Ceram, in Waru-bay, namely whether it should be a distinct species or only a variety of *Upog. carinicauda*.

The coasts of Japan are apparently only inhabited by one single species, *Upog. major* (de Haan), which, attaining a length of 10 centim., belongs to the larger representatives of the genus; it has been collected in the Bay of Tokio, at Yokohama, in Sagami Bay and a few other localities.

Upog. Issaeffi (Balss), which is related to the British *Upog. stellata*, but distinguished by the dactylus of chelipeds bearing a musical ridge, is still only known from Wladiwostok.

The west coast of America, finally, is inhabited by four species, of which three belong to the subgenus *Upogebia* s. s., one to *Calliadne*, the latter being *Upog. rugosa* (Lock.), recorded from Port Escondida, Gulf of California, which represents *Upog. operculata* from the Antilles on the west coast. *Upog. pugettensis* (Dana) is distributed from south-eastern Alaska to San Quentin Bay, Lower California; our knowledge of this species is incomplete, a more detailed description appears desirable. The isthmus of Panama is inhabited by *Upog. longipollex* (Streets), of which no figures exist; the coasts of the Island of Aseredoras, 20 miles north-west of Corinto, Nicaragua, and those of the Gulf of Fonseca, finally, are the habitat of *Upog. spinigera* (S. J. Smith), a species closely allied to the Japanese *Upog. major* (de Haan).

Key to the known species of the genus *Upogebia* Leach.

Subgenus **Upogebia** Leach.

a_1 Legs of 1st pair subchelate both in the male and in the female.

b_1 Lower border of rostrum unarmed.

c_1 No spines bordering the lateral portions of the cervical groove behind.

d_1 Front tridentate, the lateral teeth reaching about half-way to the point of the mesial portion or rostrum.

Lower border of palmar portion of chelipeds with a row of small sharp teeth (except in the smaller cheliped of *Upogebia* sp. α)

e_1 Antennular flagella of equal length and shorter than the 3rd joint of the peduncle. Chelipeds unequal or equal.

f_1 Chelipeds in the male unequal. The fixed finger of the larger chela of the male measures about one-third the length of the dactylus, is twice as long as broad at its base and its prehensile edge is entire, unarmed, but there are 5 very small teeth of unequal size on the distal border of the palm between the immobile finger and the articulation of the dactylus. Proportion between length and width of telson like 15 : 18. . . . . *Danai* (Miers)

(E. J. Miers, in: Annals Mag. Nat. Hist. Ser. 4. XVII. London 1876, p. 223. —

CH. CHILTON, in: Transact. New Zealand Institute, Vol. XXXIX, 1906, Wellington 1907, p. 460 [1]). — J. G. DE MAN, A contribution to the knowledge of twenty-one species of the genus *Upogebia* Leach. With 79 illustrations on 6 plates. 's Gravenhage 1927, in: Capita Zoologica. Verhandelingen op systematisch-zoologisch gebied onder redactie van Prof. Dr. E. D. VAN OORT. Deel II, Afl. 5, p. 22—26, Pl. III, figs. 9—9*d*).

f_2 Chelipeds in the female equal. Immobile finger of the chelipeds of the female measuring only one-fifth the length of the dactylus, of a stout shape, one and a half times as long as high at its base; the prehensile edge is armed on the proximal half with 4 small subacute teeth, but the distal border of the palm between the fixed fiinger and the articulation of the dactylus is unarmed. Proportion between length and width of telson like 15 : 20. . . . . *Simsoni* (Thomson)

(G. M. THOMSON, in: Papers and Proc. Royal Soc. of Tasmania for 1892. Tasmania 1893, p. 49, Pl. I, fig. 3—5. — S. W. FULTON and F. E. GRANT, in: Proc. Royal Soc. Victoria, Vol. XIV (New Series) Pt. II. Melbourne 1902, p. 61, Pl. V, fig. 5, 6. — J. G. DE MAN, l. c. p. 24).

e_2 Antennular flagella almost twice as long as the third joint of the peduncle. Chelipeds unequal.

Lateral frontal lobes or teeth separated from the rostrum by broad concave interspaces. Lower border of the palm of the left larger cheliped finely denticulate, that of the other cheliped entire *Upogebia* sp. α.

d_2 Front tridentate, the lateral lobes or teeth reaching only one-third to one-fifth the way to the point of the rostrum.

g_1 Upper border of merus of chelipeds unarmed.

h_1 Lateral frontal teeth short (the exact relative length has not been described). Carpus short triangular, with a spine at apex of upper border and another smaller one a short distance below it, also a row of short spinules near its lower border. Chela pilose at the margins, but not spinulous nor dentate, excepting a spine just below the finger-cleft, outer side. *pugettensis* Dana

(J. D. DANA, U. S. Explor. Exped. Crust., p. 510, Pl. 32, fig. 1*a*—*d*).

h_2 Lateral frontal teeth reaching one-fourth the way to the point of the rostrum. Carpus with 1 or 2 minute teeth at apex of upper border and with a long spine at the distal extremity of lower. Upper border of propodus with two parallel ridges, of which the inner is finely denticulate, the other smooth, lower border of the palm denticulate. No tooth on the antero-lateral border of carapace . . . . *Osiridis* Nobili

1) The specimens, described by Prof. CHILTON, were no doubt males, for they bore no pleopods on the 1st segment of the abdomen; the chelipeds are described by him as subequal. They may be equal in the female, which is still unknown, as far as I know. In the male of *Upog. Simsoni* the chelipeds seem to be equal, as results from the figure 5 in the paper of FULTON and GRANT, that represents an adult male.

(G. Nobili, in: Bull. Mus. d'Hist. Nat. Paris 1904, N° 5, p. 235 and in: Bull. Scientif. France et Belgique. XL, 1906, p. 62, Pl. IV, fig. 14. — J. G. de Man, l. c. p. 26, Pl. III, Fig. 10—10*b*).

g_2 Upper border of merus of chelipeds armed with a spine near the distal extremity.

i_1 Upper border of dactylus of chelipeds bearing along its whole length a stridulating ridge consisting of about 80—90 transverse striae.

Palmar portion of chelipeds almost twice as long as high, of a stout shape, lower border unarmed, but an oblique row of small acute granules runs on the lower half of the outer side from the proximal extremity of the lower border to the distal margin just below the finger-cleft, where one observes a larger tooth . . . . *Issaeffi* (Balss)

(H. Balss, in: Abhandl. Math.-Phys. Klasse der K. Bayer. Akad. Wiss. II Suppl. Bd. 10. Abhandl. München 1914, p. 89, fig. 48. — J. G. de Man, l. c. p. 27).

i_2 No stridulating ridge consisting of transverse striae on the upper border of the dactylus of the chelipeds.

j_1 Palmar portion of chelipeds, measured along the upper border, about one and a half times as long as broad or high, of a stout shape, lower half of its inner surface granular.

Prehensile edge of immobile finger smooth, unarmed.

k_1 Lower border of palmar portion of chelipeds flattened, triangular, bordered on each side by a granulated, hairy line. Granules on the inner surface of the palm of equal size . . . . . *littoralis* (Risso)

(A. Risso, Hist. Nat. des Crustacés des Environs de Nice. Paris 1816, p. 76, Pl. 3, fig. 2. — C. Heller, Die Crustaceen des südlichen Europa, Wien 1863, p. 205, Taf. VI, fig. 12—15. — J. G. de Man, l. c. p. 29, Pl. III, fig. 11—11*b*).

k_2 Lower border of palmar portion of chelipeds not flattened, armed with a row of acute teeth from the proximal extremity to the base of the immobile finger. Of the sharp granules on the inner surface of the palm one near the lower border, at the base of the fixed finger, is much larger than the rest.

A few minute, more or less acute granules border the lateral portions of the cervical groove behind . . *capensis* (Krauss)

(F. Krauss, Die Südafrikanischen Crustaceen. Stuttgart 1843, p. 54. — H. Balls, in: Zoolog. und anthropol. Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika. V. Band. 2. Lief. Jena 1913, p. 108 (62), Fig. 7 u. 8. — J. G. de Man, l. c. p. 32, Pl. III, fig. 12).

j_2 Palmar portion of chelipeds, measured along the upper border, twice or a little more than twice as long as broad or high, of a more or less slender form, lower half of inner surface smooth.

l_1 Lower border of palmar portion of chelipeds flattened, as in *Upog. littoralis*, the borders finely granular, the triangular surface more elongate than in this species.

Outer uropod barely longer than broad. Prehensile edge of the immobile finger of chelipeds in the female with 6 or 7 small subequal teeth on the proximal half *neglecta* de Man

(J. G. DE MAN, l. c. p. 34, Pl. IV, fig. 13—13*e*).

l_2 Lower border of palmar portion of chelipeds not flattened.

m_1 Palmar portion of chelipeds in the male twice as long as broad or high. Outer uropod barely longer than broad. Prehensile edge of immobile finger denticulate . . . . . *stellata* (Montagu)

(G. MONTAGU, in: The Transact. Linnean Soc. London, IX, T. III, 1805, (1808), fig. 5, p. 89. — TH. BELL, A History of the British Stalk-eyed Crustacea. London 1853, p. 223. — J. G. DE MAN, l. c. p. 36, Pl. IV, fig. 14—14*d*).

m_2 Palmar portion of chelipeds in the male 3,5-times as long as broad or high. Outer uropod one and a half times as long as broad. Prehensile edge of immobile finger unarmed . . . . . *gracilipes* de Man

(J. G. DE MAN, l. c. p. 40, Pl. IV, fig. 15, 15*a*, Plate V, fig. 15*b*—15*d*).

d_3 Front tridentate, the acute lateral lobes reaching only one-sixth the way to the point of the rostrum, which is triangular, one-fifth longer than broad at its base, with rounded tip and of which the lateral borders bear each 5 or 6 small, subacute, equidistant teeth.

Telson not yet half as long as 6th somite, one-fourth broader than long; both uropods considerably longer than the telson, outer uropod more than twice as long as the telson and more than twice as long as broad.

Chela slender, upper border armed with 6 or 7 small spines along its whole length, lower border with 2 small spines near the proximal extremity, dactylus 5-times as long as the fixed finger. Length 12 mm. . . . . *fallax* de Man

d_4 Front not or hardly at all trilobed, the lateral lobes or teeth measuring less than one-sixth the length of the rostrum.

n_1 There are no prominent spines on any of the joints of the chelipeds, but they are copiously provided

with setae. Rostrum short, not extending beyond the eyes, lateral tooth on each side almost obsolete. The immobile finger, which is rather less than half the length of the dactylus, impinges on a prominent tooth of the latter, so that a false chela is thereby formed *pseudochelata* Tatt.

(W. M. TATTERSALL, in: Journ. Linnean Soc. London, Zoology, Vol. XXXIV, April 1921, p. 395, Pl. 28, fig. 16—22).

n_2 Chelipeds armed with spines.

o_1 Upper border of propodus of chelipeds not armed along its whole length with spines.

p_1 Upper border of merus of chelipeds armed with two minute teeth of equal size, placed close by and behind one another near the distal end, upper border of dactylus of these legs with four sharp teeth on the distal third part.

Immobile finger projecting by one-seventh the length of the propodus beyond its distal border, armed with 6 or 7 very small teeth on the proximal half of the prehensile edge. Rostrum little longer than the eyes, rounded, almost as long as broad at its base, each lateral border with three teeth, of which the anterior is a little larger than the two others. A species perhaps of small size, the single known specimen being 17 mm. long . *Balssi* de Man

(*Upogebia hirtifrons* H. Balss, Die Decapoden des Roten Meeres. II Anomuren, Dromiaceen und Oxystomen, Wien 1915, p. 2, in: Denkschr. Kais. Akad. Wiss. Wien, mathem.-naturw. Klasse, 92 Band. (Nec WHITE). — G. NOBILI, in: Bull. Scientif. France et Belgique, XL, 1906, p. 61, Pl. IV, fig. 13. — J. G. DE MAN, l. c. p. 43, Pl. V, figs. 16—16*f*).

p_2 Upper border of merus of chelipeds armed with one tooth near the distal end, upper border of dactylus of these legs without teeth.

q_1 Rostrum just as long as broad at its base, obtuse, each lateral border armed with four or five subacute tubercles, rostrum twice as long as the eyepeduncles. Lower border of palmar portion of chelipeds rounded, unarmed, fixed finger short, measuring one-sixth the length of the upper border of the propodus and one-fourth that of the dactylus, prehensile edge with a low truncate tooth at the base . . . . . *hirtifrons* (White)

(A WHITE, in: Proc. Zool. Soc. London, 1847, p. 122. — CH. CHILTON, in: Transact. New Zealand Institute, Vol. XXXIX, 1906. Wellington 1907, p. 457. — J. G. DE MAN, l. c. p. 45, Pl. V, figs. 17—17*b*.

q_2 Rostrum short, reaching but little beyond the eyepeduncles, each lateral border armed with two spiniform teeth. Immobile finger of chelipeds measuring no less than one-fourth the length of the upper border of the propodus and a little more than half the length of the dactylus, its prehensile border presenting several teeth.

r_1 Second, third and fourth abdominal segments not carinate. Lower border of propodus of chelipeds with a sharp tiny spinule (often broken off) near the base of the fixed finger.

s_1 Merus of chelipeds of the male little more than twice as long as broad, viz., $2^1/_3$-times. Palmar portion of these legs in the male barely more than twice as long as high near the carpus and almost twice as long as the dactylus. . . . . *carinicauda* (Stimps.)

s_2 Merus of chelipeds of the female $2^2/_3$-times as long as broad, palmar portion of these legs in the female $2^1/_3$-times as long as high near the carpus, dactylus measuring two-thirds the length of the palm, fixed finger one-third the length of the dactylus . . . . . *carinicauda* Stimps. var. *gracilipes* de Man

r_2 Second, third and fourth abdominal segments carinate in the middle line. No tiny spinule on the lower border of the propodi of chelipeds. Both fingers, especially the dactylus, strongly incurved, prehensile edge of this finger with 5 teeth in the middle, four small teeth on the proximal half of the immobile finger . . . *Upogebia* sp. β.

o_2 Upper border of propodus of chelipeds armed along its whole extent with five spines.

Rostrum broadly triangular, one-third longer than broad, with obtuse tip, each lateral border presenting five subacute conical teeth. Front not trilobed. Length of telson three-fourths that of sixth somite, telson once and a half as broad as long, transverse carina of telson feeble, interrupted in the middle, lateral carinae more distinct. Uropods a little longer than telson. Chelipeds resembling those of *Gebicula exigua* Alcock, but the dactylus

impinges against a short immobile finger; one single spine midway between the acute extremity of the fixed finger and the carpus on the lower border of the inner side of the somewhat distorted palm, lower border of the outer side straight and finely serrate.

Length 18,5 mm. . . . . *pugnax* de Man

c_2 Two, three or more short spines or sharp teeth bordering the lateral portions of the cervical groove behind.

t_1 Immobile finger of chelipeds much shorter than dactylus, dactylus above with a longitudinal row of oblique unguiform tubercles. Lateral portions of the cervical groove bordered, as well above as below the *Linea thalassinica*, by three or four acute teeth, that are followed towards the antero-lateral margin of the carapace by several smaller ones. Length 10 centim. . . . . *major* (de Haan)

(W. DE HAAN, Fauna Japonica, Crustacea, 1849, p. 165, Pl. XXXV, fig. 7. — J. G. DE MAN, l. c. p. 47, Pl. VI, fig. 18).

t_2 Immobile finger of chelipeds little shorter than dactylus, nearly straight, tapering to a slender point, dactylus clothed with long lines of pubescence and the prehensile edge armed with an obtuse tooth near the base and, near the tip, with a large slender one which shuts just by the tip of the fixed finger. . . . *spinigera* (S. I. Smith)

(SIDNEY J. SMITH, in: Report of the Peabody Academy of Science, Salem, Mass. 1869, published March 1871, p. 92).

b_2 Lower border of rostrum armed with one or more spines or acute teeth. One or more acute spinules border the lateral portions of the cervical groove behind.

u_1 Upper border of propodus of chelipeds with two parallel ridges of which the smooth outer one bears one single small spine at the proximal extremity, while the inner is finely denticulate along its whole extent; outer and inner side of palm without spines.

Lower border of rostrum in the male with one single spine, in the female with three small equal or unequal teeth. One

or two minute acute spines on the lateral portions of the cervical groove behind, immediately below the *Linea thalassinica*. *affinis* (Say)

(Th. Say, An Account of the Crustacea of the United States, in: Journal Acad. Nat. Sciences of Philadelphia, Vol. I, Part II, Philadelphia 1818, p. 241. — J. G. de Man, l. c. p. 50, Pl. VI, figs. 19—19*g*).

u_2 Upper border of propodus of chelipeds armed with spines along its whole extent.

v_1 Lower border of rostrum armed with one single spine.

w_1 Posterior margin of telson deeply emarginate. Upper border of propodus of chelipeds with 15 or 16 strong spines, arranged in three longitudinal rows, lower border with 3 very small spinules. Dactylus nearly straight, little shorter than the palm, with a few minute teeth above near the base,

Length of female 10,56 mm. . . . *ceratophora* de Man

w_2 Posterior margin of telson slightly concave. Upper border of propodus of chelipeds with 8 or 9 equidistant spines, lower border of outer side straight, unarmed, lower border of inner side armed with one single, large spine midway between the fixed finger and the carpus. Dactylus slightly curved, measuring three-fourths the length of the palm, unarmed.

Length 13,75 mm. . . . . *monoceros* de Man

v_2 Lower border of rostrum armed with three to five spines of unequal size, curved forward

x_1 Lateral frontal lobes well-developed, reaching about to the middle of rostrum, smooth, excepting a small acute tubercle at the tip and two small acute teeth below near their extremity; rostrum one and a half times as long as broad at its base, distal half smooth, destitute of teeth. Upper border of carpus of 2nd legs with a single spine . . . . . *spinifrons* (Haswell)

(W. A. Haswell, Catal. Australian Stalk- and Sessile-eyed Crustacea, Sydney 1882, p. 165, Pl. III, fig. 5. — J. G. de Man, l. c. p. 53, Pl. VI, figs. 20—20*e*).

x_2 No lateral frontal lobes („la carène gastrique qui délimite de chaque côté la face dorsale gastrique ne fait pas saillie en pointe à la base du rostre" (E. L Bouvier). Rostrum larger and longer than that of *Upog. littoralis*, the two terminal teeth placed closer together.

Upper border of carpus of 2nd legs with a longitudinal row of 4 or 5 spines *Talismani* Bouv.

(E. L. Bouvier, in: Bull. Mus. Nat. d'Histoire Nat. Paris, Année 1915, N°. 6, p. 184).

a_2 Legs of 1st pair subchelate in the male, monodactylous in the female. Rostrum narrow, with a rather sharply rounded apex, which is not provided with teeth or spinules. Lateral frontal teeth long and sharp, measuring one-third the length of the rostrum, upper surface of the rostrum and of the lateral ridges without a trace of granules or tubercles. There where the cervical groove is cut by the *Linea thalassinica*, a stout hepatic spine is observed . . . . . *heterocheir* Kemp

(Stanley Kemp, Memoirs of the Indian Museum, Calcutta 1915, Vol. V, p. 257, Pl. XIII, fig. 6, 7, text-figures 22—24).

Subgenus **Calliadne** Strahl.

a_1 Distal or posterior margin of telson less broad than the proximal or than the greatest width.

b_1 Frontal border of carapace trilobed, the middle lobe or rostrum separated by a wide interval from the lateral lobes, that are the anterior extremities of the lateral ridges of the gastric region. Rostrum shorter than or as long as the eyepeduncles.

c_1 No spines on the lateral sides of the carapace.

d_1 Rostrum broadly triangular, obtuse, with the margins diverging backwards and armed each with 4 or 5 granuliform teeth, which are not larger than those of the gastric region. Lower border of propodus of chelipeds rounded, unarmed . . . . . *Savignii* (Strahl)

(Strahl, in: Monatsber. der K. Akad. der Wissens. Berlin 1861, p. 1064. — J. G. de Man, l. c. p. 5, Pl. I, fig. 1).

d_2 Rostrum narrow triangular, each lateral border armed with 5 or 6 spiniform teeth, which are larger than those of the gastric region. Lower border of propodus of chelipeds denticulate. . *rhadames* Nobili

(G. Nobili, in: Bulletin du Muséum d'Hist. Nat. de Paris, 1904, N°. 5, p. 235. — J. G. de Man, l. c. p. 6, Pl. I, fig. 2).

c_2 Lateral parts of the cervical groove, on the lateral sides of the carapace, armed with a row of three or four sharp spines.

Upper border of merus of chelipeds with a spine near the distal end, lower with three spines of equal size on the proximal third part, carpus with a spine at the distal end of the lower and of the upper border and with two or three on the distal border, lower border of propodus near the carpal articulation with a spine, upper border of propodus with five small spines or teeth along its whole length . . . . . *furcata* (Aurivillius)

(Carl W. S. Aurivillius, in: Bihang till K. Svenska Vet.-Akad. Handlingar, Stockholm 1898, Bd. 24, Afd. IV, N: 01, p. 13, Taf. I, fig. 5—7. — J. G. de Man, l. c. p. 7, Pl. I, figs. 3—3*b*).

b_2 Lateral frontal lobes short, separated from the rostrum by a narrow interspace.

e_1 Rostrum with 3—5 teeth on each lateral border, excepting *Upog.* (*Calliadne*) sp. from San Thomé, in which there are only 2. Rostrum separated by a distinct, though narrow interspace from the terminal teeth of the lateral ridges i. e. from the lateral frontal lobes.

f_1 Fingers of chelipeds of equal length. Third joint of antennular peduncle of a stout shape, less than 5-times as long as broad, much shorter than the flagella. Hinder edge of 6th segment of abdomen armed with microscopical spinules or teeth along its whole extent or along a part of it.

g_1 Rostrum with 5 teeth on each lateral border, distinctly or considerably outreaching the eyes. Upper border of merus of chelipeds with a small tooth near the distal extremity at the inner side.

h_1 The lower border of the chela bears some small teeth at the inner side on its proximal half, outer surface of propodus smooth. Posterior margin of 6th segment of abdomen denticulate along its whole extent, except near the lateral angles. Upper surface of the rostrum, which is a little longer than the eyes, anteriorly deflexed, appearing arcuate in a lateral aspect. Lower border of merus of chelipeds finely denticulate . . . . . *Bowerbankii* (Miers)

(E. J. Miers, Report on the Zoolog. Coll. made in the Indo-Pacific Ocean during the voyage of H. M. S. "Alert" 1881—1882. London 1884, p. 282. — J. G. de Man, l. c. p. 9, Pl. I, figs. 4—4*f*).

h_2 The chela bears two or three sharp thorns near the base below, some tubercles on the outside and towards the end of the upper surface. There is a group of small spinules at each hinder angle of 6th segment of abdomen. The rostrum considerably outreaches the eyes . . . . . *cargadensis* Borr.

(L. A. Borradaile, in: The Transact. of the Linnean Soc. of London.

2nd Ser. Zoology. Vol. XIII. Part 2. London 1910, p. 263, Pl. 16, fig. 6. — J. G. DE MAN, l. c. p. 12, Pl. II, fig. 5).

g_2 Rostrum with 3 or 4 teeth on each lateral border. Upper border of merus of chelipeds unarmed.

i_1 Inner lower border of merus of chelipeds armed with small sharp teeth, lower border of propodus finely denticulate. Rostrum about as long as the eyepeduncles . . . . . *hexaceras* (Ortm.)

i_2 Inner lower border of merus and lower border of propodus of chelipeds smooth, unarmed.

j_1 Rostrum a little shorter than the eyepeduncles or barely shorter. Lower or thinner antennular flagellum one-fourth longer than the other, composed of 17 joints that are all longer than thick; measured in the middle the upper flagellum appears $2^1/_2$-times as broad as the other . . *octoceras* Nobili

(G. NOBILI, in: Bulletin du Muséum d'hist. nat. de Paris, 1904, N°. 5, p. 236. — J. G. DE MAN, l. c. p. 13, Pl. II, figs. 6—6*e*).

j_2 Rostrum distinctly longer than the eyepeduncles. Lower or thinner antennular flagellum almost one and a half times as long as the other, with 30 segments that are not all longer than thick; measured in the middle the upper flagellum appears only $1^1/_2$-times as broad as the other *octoceras* Nobili var. *australiensis* de Man

(J. G. DE MAN, l. c. p. 14, Pl. II, fig. 7—7*c*).

f_2 Immobile finger of chelipeds one-third shorter than dactylus. Third joint of antennular peduncle slender, more than 5-times as long as thick in the middle. Hinder edge of 6th segment of abdomen smooth.

k_1 Rostrum considerably longer than the eyes, with 4 or 5 teeth on either lateral border. Third joint of antennular peduncle 9-times as long as thick in the middle, as long as the flagella. A species attaining the length of 5 or 6 inches . . . . . *deltaura* Leach.

(W. E. LEACH, in: The Transact. Linnean Soc. of London, XI, 1815, p. 342 and in: Malacostr. Podophth. Brit. T. XXXI, figs. 9—10. — J. G. DE MAN, l. c. p. 17, Pl. II, figs. 8—8*b*.

k_2 Rostrum little longer than the eyes, with 2 teeth on the distal half of either lateral border, distance between the two posterior a little more than twice as broad as that between the two anterior. Third joint of antennular peduncle 6-times as long as thick in the middle, half as long as the flagella. Length 19 mm.

Perhaps a juvenile stage of *Upog. deltaura* Leach . sp. ? de Man.

(J. G. DE MAN, l. c. p. 19).

e_2 Rostrum with 2 teeth on each lateral border.

l_1 Anterior pair of rostral teeth contiguous to one another. Carpus and merus of chelipeds unarmed . . . . . *nitida* (A. M.-Edw.)

(A. MILNE EDWARDS, in: Nouv. Archives du Muséum d'hist. nat. de Paris. Mémoires. T. IV. Paris 1868, p. 63, Pl. 18, fig. 4 to 7. — J. G. DE MAN, l. c. p. 21).

l_2 Anterior pair of rostral teeth not contiguous to one another. Carpus and merus of chelipeds armed with spines.

m_1 Telson presenting only one transverse carina anteriorly, passing as usual on each side into a longitudinal lateral one.

n_1 Telson about one and a half times as broad as long. Fingers not strongly curved. Eggs very numerous, 0,6—0,7 mm. broad . . . . . *Darwinii* (Miers)

n_2 Telson subquadrate, little broader than long. Fingers strongly curved. Eggs few in number, large, 0,9 mm. broad . . . . . *ancylodactyla* de Man

m_2 Telson presenting a second transverse carina immediately behind the anterior one. Eggs 0,6 mm. broad *ancylodactyla* de Man var. *amboinensis* de Man

a_2 Telson presenting its greatest width at the distal or posterior margin. The three posterior segments of the abdomen, the telson included, are complexly but symmetrically wrinkled.

o_1 Scabrous surface of gastric region virtually disappearing on the posterior third or fourth of the anterior part of carapace, just before the cervical groove. Fingers of chelipeds short and stout, immovable finger the longer.

A West-Indian species . . . . . *operculata* W. L. Schmitt

(WALDO L. SCHMITT, in: University of Iowa Studies in Natural History, Vol. X, N°. 4, 1924, p. 91, Pl. V, figs. 1—4).

o_2 Upper surface of rostrum and carapace beset with small tubercles and hirsute to about half way to the cervical groove.

A species inhabiting the Gulf of California . . *rugosa* (Lockington) [1])

(W. N. LOCKINGTON, in: The Annals and Mag. of Nat. Hist. Fifth Series, Vol. II. London 1878, p. 299).

1) LOCKINGTON's description is not clear as regards the length of the fingers. He writes: "dactylus less than half the length of the palmar portion of the hand, which is thickly hirsute, curved regularly downwards, its tip passing beyond that of the dactylus". In the first place instead of the last word "dactylus" one should read "immovable finger", but even in this case it remains, in my opinion, uncertain whether the dactylus is longer or shorter than the fixed finger.

The five following species are not taken up into the key:

Upogebia africana Ortm. (A. Ortmann, Crustaceen der Semonschen Forschungsreisen, in: Jenaische Denkschr. Mediz.-Naturw. Gesellschaft, Bd. VIII, 1894, p. 22, Taf. II, fig. 4). According to Prof. Balss, in: Zoolog. und anthropol. Ergebnisse einer Forschungsreise im westl. und zentr. Südafrika, V. Band, 2 Lief., Jena 1913, p. 109 (63), this species should be identical with *Upog. capensis* (Krauss). *Upog. africana* was founded on a much damaged, dry specimen, so that the absence of a spine on the upper border of the merus of the two first pairs of legs may be owing to this spine having been worn off. Ortmann's description seems to be inaccurate: he describes two spines instead of one on the inner surface of the propodus, near the lower border, at the base of the fixed finger, while in his figure 4*a* only one is drawn.

Upog. littoralis (G. O. Sars) 1884 (nec Risso). (G. O. Sars, Bidrag til Kundskaben om Decapodernes Forvandlinger, in: Arch. Math. Naturw., IX, 1884, p. 182, Tab. 3—5. — G. E. Webb, The Development of the Species of *Upogebia* from Plymouth Sound, in: Journ. Mar. Biol. Association. New Series. Vol. XII, N° 1. Plymouth 1919, p. 84).

Upog. longipollex (Streets) (F. Hale Streets, in: Proc. Acad. Nat. Sciences of Philadelphia, December 5, 1871, p. 242) from the Isthmus of Panama will perhaps once prove to be identical with *Upog. spinigera* (S. I. Smith) from the island of Aseredoras, twenty miles north-west of Corinto, Nicaragua, and in this case Smith's name should have the priority, because his description has been issued in March 1871 (according to an autograph (of the writer?) on my reprint of his paper), that of Streets in December of this year. Streets's brief description agrees quite well with that of Smith. Of *Upog. longipollex* the 3rd and 4th legs are, however, said to be unarmed, while in *Upog. spinigera* these legs are armed with spines; Streets mentions the length of about 28 mm. (1,12 inch) for his species, while *Upog. spinigera* attains the length of 41 mm, so that perhaps in Streets's younger specimen the spines of the 3rd and 4th legs were not yet developed.

Upog. subspinosa (Stimps.) (W. Stimpson, in: Proc. Acad. Nat. Sciences of Philadelphia, January 1860, p. 22) from Simon's Bay, near Cape of Good Hope, could not be inserted into the key, because Stimpson's diagnosis is too brief. It is no doubt closely allied to *Upog. capensis* (Krauss), the inner surface of the propodus of chelipeds being also armed with a spine near the immovable finger, but it differs apparently by the prehensile edge of this finger being armed with two minute teeth and by the upper border of the dactylus bearing a crenulate carina. Stimpson was only acquainted with the female; in the two adult females of *Upog. capensis* (Krauss) from Lüderitz Bay, that kindly were sent me for examination by Prof. Balss of the Museum of Münich, the prehensile border of the fixed finger is smooth and entire, while the smooth upper surface of the dactylus is bordered on each side by a longitudinal row of small acute teeth. In these two females the coxae of the 1st and 2nd legs are, as in *Upog. subspinosa*, armed with a small acute spine, those of the 3rd are unarmed.

sp. Borradaile 1904 (L. A. Borradaile, The Fauna and Geography of the Maldive and Laccadive Archipelagoes. Vol. II, Part 3, 1904, p. 752).

1. *Upogebia* (*Upogebia*) sp. *α*. Pl. I, Fig. 4, Pl. II, Fig. 4*a*—4*f*.

Stat. 149. August 10/11. Fau-anchorage and lagune, West coast of Gebé-island. 31 m. Reef-exploration, coral. One male.

In his interesting "Notes on the Callianassidae of New Zealand" (in: Transactions of the New Zealand Institute, Vol. XXXIX, 1906), Professor CHILTON does not at all mention *Upog.* (*Upogebia*) *Simsoni* (Thomson), a species that occurs on the east coast of Tasmania and on the coast of Western Port, Victoria; it was first described in the "Papers and Proceedings of the Royal Society of Tasmania, for 1892. Tasmania 1893, p. 49, Pl. I, fig. 3—5". This fact strikes the more, because this *Upog. Simsoni* is very closely related to *Upog.* (*Upogebia*) *Danai* (Miers) = *Gebia hirtifrons* Dana (nec WHITE), being certainly the nearest allied species; for *Upog.* (*Upogebia*) *Danai* (Miers) I refer to the detailed description of this species in my work, entitled: "A contribution to the knowledge of twenty-one species of the genus *Upogebia* Leach. 's Gravenhage 1927, p. 22, Pl. III, fig. 9—9*d*", that has appeared in the "Capita Zoologica". *Upog. Simsoni* was founded by THOMSON on a single specimen, an ovigerous female which was 44 mm. long, thus just as long as the species described by DANA. The specimens, examined by CHILTON and assigned by him to *Upog. Danai* (Miers), were obtained at Auckland Harbour and at Stewart Island; they belong probably indeed to this species, because the antennular flagella are described as shorter than the 3rd joint of the peduncle and the lower border of the palm of the 1st pair of legs beset with a row of small teeth, characters mentioned also by DANA, though it is remarkable that DANA describes the caudal segment (telson) as being not broader than long and that in his figure 2*e* the telson appears even a little longer than broad. With regard to this point Prof. CHILTON remarks "in the two specimens that I have been able to examine closely the telson is appreciably though not greatly broader". The antennular flagella of *Upog. Simsoni* are described as being both "extremely short", but the author does not say whether they are shorter than the 3rd joint of the peduncle or not.

The specimen from Stat. 149 belongs perhaps to *Upog. Danai*, is, however, not yet referred to it, because the inner margins of the lateral frontal teeth (Fig. 4) pass with a regular curve into the lateral margins of the rostrum as in *Upog. Simsoni*, whereas in DANA's species they make sharp angles with one another (DANA, Pl. 32, fig. 2*b*), because the telson appears distinctly, viz., one-fourth, broader than long and, finally, because the antennular flagella, though short, are almost twice as long as the 3rd joint of the peduncle. These differences are perhaps owing to the young age of our specimen, but further researches are necessary for determining the specific differences between *Upog. Danai* and *Upog. Simsoni* — when they are not identical; THOMSON namely compares his species with the much more different *Upog. spinifrons* (Haswell), but not with *Upog. Danai*, DANA's work having perhaps not been at his disposal. As was already remarked, the specimen from Gebé-island is young, the carapace is 4,3 mm. long, the abdomen 10 mm., the whole length about 14 mm. The front is strongly trilobed, but its form differs somewhat from DANA's figure 2, because (Fig. 4) the middle lobe is separated by wider interspaces from the lateral ones. Anteriorly at the base of the lobes the carapace is 1 mm. broad and the tip of the median lobe (rostrum) is 2,7 mm. distant from the cervical groove. This triangular middle lobe is 0,61 mm. long, the lateral lobes 0,22 mm.; the former measures one-seventh the length of the carapace and is almost 3-times as long as the two others.

The acute middle lobe bears on the tip a spine long 0,1 mm., which is followed on either side by four or five others that gradually become smaller and pass into tubercles that all are placed obliquely upon the lateral margins of the rostrum and both rows of tubercles are continued on the gastric region to a little beyond the middle of the distance between the tip of the rostrum and the cervical groove, there being still 11 or 12 tubercles in each row behind the front; both rows diverge backward, being a continuation of the lateral borders of the middle lobe or rostrum. The middle lobe bears moreover on its posterior half, at either side of the middle line, a row of 3 or 4 smaller tubercles, but these rows are not continued on to the gastric region. The lateral margins of the gastric region, like also those of the lateral frontal lobes, run parallel with one another; the lateral lobes are also acute and triangular, though not symmetrical as is the middle lobe, because the inner margins of the former distinctly converge backward and pass with a regular curve into the lateral margins of the rostrum. In DANA's figure 2*b*, however, the inner margins of the lateral lobes make sharp angles with the lateral margins of the rostrum. The lateral borders of the gastric region present some little prominent, slight denticulations, but those of the lateral frontal lobes are smooth. The lateral margins of the rostrum carry rather long hairs, shorter setae are implanted near the tubercles on the gastric region and on the lateral borders of the latter itself.

The globular eyes that reach to midway between the apices of the median and lateral lobes, carry a very small conical tubercle on their antero-internal angle.

On the inner side of the strongly arcuate and deep cervical groove one observes some transverse rugosities on the gastric region, but for the rest the latter appears smooth and glabrous; on the posterior half there is, however, a row of puncta at either side of the middle line. *Linea thalassinica* distinct. Antero-lateral margin of the carapace without a spine behind the eyes. Abdomen a little punctate, but smooth and, excepting the 1st and 2nd segment, the terga present no furrow at some distance from the lateral margins as exist in *Upog. carinicauda* Stimps. The 3rd, 4th and 5th segments are about of equal length, the 2nd and the 6th are a little longer. The lateral borders of the strongly convex, nearly quadrate, 6th segment (Fig. 4*a*) are straight and parallel. The telson, measured in the middle line, proves to be 1,3 mm. long; it is 1,6 mm. broad, presenting the greatest width a little before the middle. The lateral margins of the telson bear namely a rounded prominence, a little before the middle, and then converge backward, passing with a curve into the posterior margin, which, slightly concave in the middle, appears bilobed, the lobes rounded. At the level of the described prominences one observes a transverse line of setae on the upper surface of the telson and a transverse elevated line runs parallel with the former at some distance behind it; both transverse lines are equally broad, a little less than half the greatest width of the telson. A narrow median furrow runs from the anterior border of the telson to the posterior transverse carina; each half of the latter appears sligthly arcuate, the concave side being turned forward. The feathered setae on the posterior margin measure one-third the length of the telson; this margin bears moreover simple hairs of the same length that are not feathered and much shorter spiniform setae, which are 0,1 mm. long. Uropods considerably longer than the telson, when directed backward; the outer almost semicircular with rounded posterior margin, the inner triangular.

First segment of abdomen without appendages, those of the following of the usual form,

so is e. g. the exopod of the pleopods of the 3rd segment 1,7 mm. long and 0,52 mm. broad, the endopod 0,84 mm. long and 0,22 mm. broad, both with feathered hairs.

The inner antennae, 1,8 mm. long, (Pl. II, fig. 4*b*), project with half their flagella beyond the antennal peduncle. The laterally compressed first joint, about 0,5 mm. long, is armed at the distal end of its lower margin with a small acute spine, that reaches to the second third part of the second joint and this margin carries some setae. The second joint is 0,16 mm. long, 0,12 mm. thick at its base and 0,19 mm. distally, measured laterally, appearing here a little broader than it is long; the lower border is somewhat shorter than the upper, on which a few long hairs are implanted. The third joint is 0,4 mm. long, $2^1/_2$-times as long as the second, 0,15 mm. broad at the distal extremity, 0,1 mm. at the proximal, measured on the outer side; this joint is unarmed, but carries a few hairs that are longest near the distal end. The thicker flagellum is 0,68 mm. long and 0,12 mm. thick; it is composed of only 9 segments, of which the first, 0,17 mm. long, measures one-fourth the length of the flagellum; the seven last segments are beset with the olfactory filaments. The other flagellum, 0,66 mm. long, is much thinner, only 0,06 mm. broad at the base; it is formed by 7 or 8 segments, tapers regularly to the extremity and is provided with long, fine hairs that are 0,5 mm. long. Dana describes the antennular flagella of the species which is now known as *Upog. Danai*, as being a little shorter than the last joint of the peduncle: in the specimen from Stat. 149 they are almost twice as long as the terminal joint.

The external antennae, 8,56 mm. long, are just twice as long as the carapace, almost as long as the abdomen, conform to Dana's description, and resemble much those of *Upog. littoralis*, of which specimens from Naples are lying before me. The peduncle, (Fig. 4), 1,76 mm. long, projects with the terminal and half the penultimate joint beyond the rostrum. Tuberculum on the outer side of 1st joint circular. The 2nd joint, nearly 0,4 mm. long, a little longer than 1st, reaches as far forwards as the eyepeduncles, the lower border is armed with a strong acute spine at the distal end. Near the latter on the upper side the scaphocerite is implanted, that is 0,18 mm. or 0,2 mm. long and that ends anteriorly into two sharp spines, of which the outer is somewhat longer than the other. The scaphocerite of *Upog. littoralis* terminates only in one spine. The following joint is 0,54 mm. long, somewhat longer than the 2nd, 0,19 mm. thick at base, 0,22 mm. at the distal end; this joint is unarmed, but it carries a few long hairs, some of which are arranged in an oblique row near the distal end. The cylindrical last joint is shorter than the preceding one, being 0,3 mm. long and 0,2 mm. thick, the flagellum, finally, beset with hairs of various length, is 6,8 mm. long.

Chelipeds unequal, the left being the larger. In both legs the coxa and the basis bear a spine at the distal end of their lower margin, those of the larger cheliped are 0,1 mm. resp. 0,17 mm. long, one observes moreover a spine at the proximal end of the coxa. In both legs also the lower border of the ischium (Fig. 4*c*, 4*d*) is armed with two spines, one just behind the middle, the other at the distal end, those of the larger cheliped are respectively 0,17 mm. and 0,19 mm. long. The merus of the larger leg is 2,2 mm. long, measured on the outer side, and 0,94 mm. broad in the middle; the straight lower border of the outer surface presents along its whole length small sharp denticulations, most distinct on the proximal half and also a few feathered hairs, but no spinules; the arcuate upper border is armed with a rather short

spine, 0,09 mm. long, near the distal end. Carpus 1 mm. long, with a strong spine at the distal end of its lower border and armed moreover with another smaller one at the distal inner extremity of the upper border. Palm exactly as long as the merus, measuring 2,24 mm. from the articulation of the dactylus to that of the carpus and it is 1,04 mm. broad or high at its outer side. The rather sharp, lower margin of the propodus is 2,5 mm. long from the carpal articulation to the tip of the immobile finger, which is 0,54 mm. long; the lower margin presents small denticulations, that gradually become larger until the fixed finger, the lower margin of which is entire. The cutting-edge of the pointed immobile finger bears 7 or 8 small acute teeth of equal size along its proximal half, the distal half being entire. The slightly arcuate and slender dactylus is 1,8 mm. long, 3-times as long as the immovable finger; excepting a low, obtuse prominence at one-third its length from the tip, the cutting-edge is entire, unarmed. On either side the dactylus bears a row of setae from the articulation to the slender, pointed tip. A small tuft of setae exists on the outer side of the palm, close by the finger-cleft, there are also a few hairs just below the finger-cleft, an oblique row of setae also on the outer side of the fixed finger at its base and a few along the lower border of the palm, one observes, finally, a row of hairs on the inner surface of the palm not far from and parallel with the upper border.

The merus of the other cheliped (Fig. 4*d*), the right, is 2 mm. long and 0,7 mm. broad in the middle of its outer surface; it is a little shorter than the merus of the left leg and appears also comparatively somewhat less broad. One observes along the straight lower border of the merus ten small acute spinules, all nearly of the same size and, as in the other cheliped, a small spine not far from the distal extremity of the upper border. Carpus 0,92 mm. long, with a spine at the distal end of the lower margin and another at that of the upper, somewhat on the inner side. Like in the larger cheliped the palm, measured from the articulation of the dactylus to that of the carpus, appears exactly as long as the merus, viz., 2 mm.; the outer surface of the palm is 0,52 mm. broad or high at the proximal end, but 0,74 mm. at the level of the finger-cleft, so that the palm, that gradually becomes higher distally, has another form than in the left leg. The lower border of the propodus, that is quite entire, presenting no little denticulations at all, is 2,1 mm. long from the proximal end to the acute tip of the immovable finger and this finger is 0,32 mm. long, i. e. about one-sixth the length of the lower border of the propodus. The fixed finger bears only 4 small acute teeth on the proximal half of its prehensile edge. The slender dactylus is 1,6 mm. long, just 5-times as long as the immovable finger and has the same form as in the other leg; the small low prominence on the prehensile edge, however, is situated somewhat nearer to the middle. As regards the distribution of hairs this leg agrees with the other, the hairs on the lower margin of the palm are 0,4 mm. long. The subcheliform legs of the 1st pair show everywhere a smooth surface.

The other legs (those of the 4th pair are wanting) are unarmed on coxa, basis and ischium. The meri of the 2nd are 2,14 mm. long and 0,5 mm. broad in the middle, 4-times as long as broad; there is a spine near the distal end of the upper margin and there are five smaller ones along the lower, of which the first near the proximal end is the smallest of all. The carpus, 0,8 mm. long, bears a small spinule near the distal end of its lower border. The

propodus is 1 mm. long and just half as broad in the middle; its lower border is provided with long feathered setae that are longest at the proximal end and gradually become shorter towards the distal extremity. Similar setae occur also along the upper margin of this joint and along the lower margin of the merus; the wrist appears also somewhat setose. The lower margin of the propodus is straight, the upper slightly arcuate. The terminal joints that are 0,92 mm. long and 0,22 mm. broad on their outer side near the articulation, are almost straight, only slightly incurved towards the tip; their upper margin is thickly clothed with feathered setae, that are longest near the articulation, measuring here 0,7 mm., and then gradually decrease in length. A row of shorter setae exists on each side, some also on the posterior margin.

The third legs are shorter than the second. The merus is 1,9 mm. long, 0,5 mm. broad, somewhat beyond the middle where this joint presents its greatest width; the upper border is unarmed, but along the lower are six small sharp teeth and a few setae. Carpus 1 mm. long and 0,4 mm. broad at its distal end, propodus 0,9 mm. long and 0,38 mm. broad; the scythe-shaped dactylus is 0,98 mm. long and 0,18 mm. broad. Seven sharp spinules, 0,05 mm. long, occur along the proximal two-thirds of the anterior margin, the distal third being unarmed; along the slightly convex, distal half of the posterior margin one observes a row of 12 or 13, very slender spinules placed abreast and close together, the longest of these spinules that are directed towards the extremity of the joint, are 0,09 mm. long but only 0,007 mm. broad in the middle and towards the proximal end they become gradually shorter. The anterior margin of the three last joints, as also the posterior margin of the propodus, are fringed with long feathered setae, the propodus bears moreover a tuft of stiff bristles along the distal third of its posterior margin.

The legs of the 5th pair (Fig. 4*e*, 4*f*) are subchelate. Merus 1,4 mm. long, 0,36 mm. broad in the middle, the following joint 0,9 mm. long and 0,24 mm. thick at the distal extremity; the somewhat compressed propodus is 1,1 mm. long and 0,22 mm. broad at the distal end of its outer surface. The lower margin of the propodus is somewhat produced, thus forming an obtuse fixed finger only 0,12 mm. long; this short finger (Fig. 4*f*) is armed with five rather strong spines or teeth on its prehensile border, that gradually grow longer towards the tip, the longest being 0,06 mm. long. The scythe-shaped dactylus is 0,67 mm. long, 5-times as long as the fixed finger, somewhat incurved, slender and pointed; it suddenly narrows at the base of the prehensile edge and then tapers gradually, for the rest it is unarmed, though setose. The propodus, fringed with long, feathered setae on the lower margin, presents a tuft of setae on the distal third of its outer surface, by which the fixed finger and a part of the dactylus are concealed. The carpus is also a little setose.

Dana's specimen from the Bay of Islands, New Zealand, which was erroneously referred by him to *Gebia hirtifrons*, measured nearly two inches, almost 4-times as long as the specimen from Stat. 149.

Upog. pugettensis (Dana) from the west coast of North America has also a tridentate front, but differs by the upper border of the merus being unarmed, by the strong tooth on the fixed finger of the 1st pair of legs and no doubt still by other characters (confer: W. Stimpson, The Crustacea and Echinodermata of the Pacific Shores of North America, 1857, p. 48, Pl. XXI, fig. 2).

Upog. Danai (Miers), to which the specimen from Stat. 149 perhaps belongs, has been recorded from New Zealand (Bay of Islands, Auckland Harbour, Plimmerton), from Steward Island and from the South side of Davis Straits.

2. *Upogebia* (*Upogebia*) *fallax* de Man. Pl. II, Fig. 5; Pl. III, Fig. 5*a*—5*g*.

Upogebia (*Upogebia*) *fallax* J. G. de Man, in: Tijdschr. Nederl. Dierk. Vereeniging, (2) Dl. IX, 1905, p. 601.

Stat. 303. Haingsisi, Samau Island. 36 m. One specimen, probably a male, unfortunately much damaged and broken.

This species, closely related to *Upog. pugnax* de Man, bears still a greater resemblance to *Gebicula exigua* Alcock from the Andaman Sea.

The specimen is 12 mm. long from tip of rostrum to the posterior end of the telson, the carapace measuring 4 mm., the abdomen 8 mm.; abdomen twice as long as carapace. The triangular rostrum (Fig. 5) has the same form as in *Upog. pugnax*; it is 0,64 mm. long and 0,51 mm. broad at its base, being likewise a little longer than broad, anterior extremity obtuse. The cervical groove is situated comparatively farther distant from the posterior margin of the carapace, viz., at a distance of 1,65 mm., i. e. two-fifths the length of the whole carapace. Of the lateral borders of the rostrum the right carries six, the left five, small, subacute, equidistant teeth, that slightly grow larger distally, and the lateral borders of the gastric region are armed with 11 or 12 teeth, the foremost of which, near the base of the rostrum, is larger than the preceding, larger than the foremost pair of rostral teeth and comparatively larger than in *Upog. pugnax*. As in this species the gastric area is covered, between the shallow lateral grooves, with small teeth, that are arranged anteriorly more or less distinctly in four longitudinal rows, in the middle of the gastric area more irregularly; the four rows of teeth are continued nearly to the middle of the rostrum. The rostrum and the anterior part of the gastric region are covered as in other species with feathered hairs. As in *Upog. pugnax* the anterior border of the carapace is armed on each side with one single spine; in *Upog. fallax* this spine is much smaller and placed nearer to the insertion of the antennal peduncle than to the base of the rostrum.

The abdomen resembles that of *Upog. pugnax*, except the sixth segment and the caudal fan. The abdomen shows its greatest breadth at the level of the 2nd segment, which is 1,26 mm. long and 2 mm. broad and hence it gradually narrows backwards; the 1st segment is little shorter than the 2nd, the 3rd—5th are shorter and nearly of the same length. Whereas in *Upog. pugnax* the 6th segment is about as long as the 2nd and one-third broader than long, this segment (Fig. 5*a*) appears in *Upog. fallax* much longer than broad and longer than the 2nd. The 6th segment, indeed, is 1,72 mm. long, almost one and a half times as long as the 2nd, but only 1,38 mm. broad in the middle; the lateral margins of this segment which is distinctly convex from before backwards, are parallel, slightly concave and present a very small, sharp tooth that is situated much more backwards than in *Upog. pugnax*. The telson, though much resembling that of the latter species, is less broad in proportion to its length, viz., 0,8 mm. long and 1,04 mm. broad; its posterior margin (Fig. 5*b*) is a little more concave

and carries in the middle a very small, sharp tooth. The telson appears also smaller in proportion to the 6th segment, being not yet half as long as the latter.

The uropods are still longer than those of *Upog. pugnax*, in proportion to the telson. The basal joint carries also posteriorly a small spine or tooth. The triangular, elongate, outer uropod is 2 mm. long and shows its greatest breadth of 0,76 mm. about in the middle; the nearly straight, slightly arcuate, anterior border makes a distinct, though obtuse angle with the distal margin that regularly curves into the posterior. This uropod is more than twice as long as the telson, in *Upog. pugnax*, however, less than twice as long. The inner uropod is, in proportion to the length of the outer, shorter than that of *Upog. pugnax*; it is namely 1,44 mm. long, measuring only three-fourths the length of the outer. The inner uropod shows its greatest breadth of 0,5 mm. at one-third its length from the base and hence it gradually narrows to the obtuse extremity. The caudal swimmerets are fringed with spiniform setae, the longer feathered hairs are lost.

The eyepeduncles are similar to those of *Upog. pugnax*, reach a little beyond the distal end of the antepenultimate joint of the antennal peduncle and to the middle of the rostrum (Fig. 5).

The inner antennae, 2,4 mm. long, when measured on the lower side of the body, are a little more than half as long as the carapace and extend with two third parts of the last joint of their peduncle beyond the tip of the rostrum; the peduncle, 1,36 mm. long, is but little longer than the flagella, in *Upog. pugnax* almost twice as long. The basal joint of the peduncle is 0,7 mm. long; except the distal third part this joint is considerably thickened and it carries, as in *Upog. pugnax*, a spine at the distal end of its lower border that reaches to the middle of the 2nd joint. The 2nd joint is 0,16 mm. long and 0,1 mm. thick, the slender 3rd joint is 0,5 mm. long, 0,06 mm. thick in the middle and also 8-times as long as thick. The upper flagella differ a little in the two antennulae, but this may be accidental. The upper or thicker flagellum of the right antennule is composed of 15 segments, the 1st of which is a little shorter than the 2nd; the thicker flagellum of the left consists of 13 segments and the 1st is almost one and one-half times as long as the 2nd; the segments are nearly as long or a little longer than thick and become gradually a little thicker until the 8th segment. The much thinner lower flagellum, as long as the upper, is composed of 10 slender segments of equal length, all longer than thick.

The antennal peduncle, little longer than that of the inner antennae, is 1,7 mm. long. The lower margin of the antepenultimate joint is armed with a strong spine at the distal end of its lower border and a second much smaller stands just behind it; a similar, probably movable spine, long 0,3 mm. and that apparently represents the scaphocerite, is inserted on the distal end of the upper border externally. The penultimate joint, as long as the preceding one and little longer than the terminal joint, is armed on its straight lower margin with two equal spines that are just as long as the spine at the distal end of the antepenultimate joint; one of them is placed just in the middle of the lower border, the other midway between it and the proximal end; both this joint and the terminal one are furnished above with long, feathered hairs.

External maxillipeds as in *Upog. pugnax*.

Only one of the legs of the 1st pair is present (Fig 5*c*), though broken off. The coxa is armed with a small spine on its inner border. The lower margin of the ischium bears two small spines, one at its base, the other just beyond the middle. The merus is 2,08 mm. long and 0,55 mm. broad in the middle (exclusive of the spines of the lower border); the straight upper border of this joint which is 4-times as long as broad, terminates, not far from the distal end, in a forwardly directed spine, that has the same size as those of the lower border; the latter, fringed with long feathered hairs, bears 8 or 9 equidistant, small spines, all nearly of the same size. The upper border of the conical carpus bears two, juxtaposed, equal spines at the distal end of its upper border and one, almost of the same length, at that of the lower; a fourth, as large as the two first named, stands on the distal border, probably of the inner side, but consists perhaps of 2 or 3 spiniform, contiguous or coalesced setae somewhat nearer to the upper border than to the lower, while a much smaller spine occurs near the middle of the upper border on the same side. Measured along the concave lower border of its outer side the propodus appears to be 2 mm. long from the carpal articulation to the tip of the short, immobile finger, which is only 0,24 mm. long; this finger (Fig. 5*d*) presents only two or three very small teeth at its base and there is a very small spine (perhaps two) near the articulation of the dactylus on the inner side. The concave lower border of the palm, which is almost 5-times as long as broad, being 0,43 mm. broad in the middle, is armed with two small spines, one at one-fourth its length from the proximal end, the other a little behind it. The slightly, arcuate, upper border of the palm, which is not or barely distorted, bears 6 or 7 small spines of somewhat unequal length along its whole extent. The slightly curved dactylus, the upper border of which is finely serrate or denticulate (Fig. 5*e*), measures 1,3 mm., being nearly 5-times as long as the immobile finger, against which it impinges, like in *Upog. pugnax*, when it is flexed at right angles with the propodus. The prehensile edge of the dactylus bears three very small teeth at its base (Fig. 5*d*); these teeth reach as far as the fixed finger is long and the first or proximal is a little larger than the two following that are equal.

Like those of the 1st, also the coxae of the 2nd pair bear a small spine on their inner border. Ischium (Fig. 5*f*) unarmed. The merus, 2,2 mm. long and 0,41 mm. broad in the middle, is 5-times as long as broad; the straight upper border terminates, not far from the distal end, in a forwardly directed spine. The lower border, fringed with very long, feathered hairs, is armed with five spines, that are nearly of the same length and as long as the subterminal spine of the upper border; the first is placed at the proximal end, the fifth just beyond the middle, the three others between them at somewhat unequal distances. The carpus, 1,04 mm. long, 0,4 mm. thick distally, is armed with two spines placed close by and behind one another near the distal end, the posterior is a little longer than the other; there is also a spine near the distal end of the lower border. The propodus, 1,12 mm. long and 0,42 mm. broad in the middle, is almost 3-times as long as broad, barely longer than the carpus and little more than half as long as the merus; both margins are fringed with feathered hairs, those of the lower being very long, just as long as those of the merus. The pointed dactylus, 0,8 mm. long, measures nearly two-thirds the length of the propodus; it is very closely fringed with feathered hairs on the upper border, those of the lower are simple and less numerous.

The legs of the 5th pair (Fig. 5*g*) are subcheliform. The dactylus, which is strongly

curved like the fourth part of a circle and the margins of which are beset with small teeth or spines, is nearly twice as long as the immobile finger; the propodus is 1,12 mm. long until the extremity of the immobile finger and 0,205 mm. broad in the middle, narrowing a little proximally, widening somewhat towards the articulation with the dactylus; it is partly concealed distally by a brush of hairs. The carpus is a little shorter, measuring 0,88 mm.

All the pleopoda are lost.

Besides by the different character of the first pair of legs that are not subcheliform, but simple, the dactylus not impinging against anything when flexed at a right angle with the propodus, *Gebicula exigua* Alcock from the Andaman Sea apparently differs both from *Upog. pugnax* de Man and from *Upog. fallax* de Man by the following. The lateral margins of the rostrum are unarmed and the gastric region carries apparently neither teeth nor hairs; the anterior margin of the carapace is armed with three or four spines. The appendages of the sixth segment of the abdomen are broadly foliaceous and their form is different (Confer: A. Alcock, A descriptive Catalogue of the Indian Deep-Sea Crustacea, Calcutta 1901, Pl. II, fig. 4). There are no doubt still other differences.

3. *Upogebia* (*Upogebia*) *carinicauda* (Stimps.). Pl. III, Fig. 6—6*c*; Pl. IV, Fig. 6*d*—6*n*.

Gebia carinicauda W. Stimpson, in: Proc. Acad. Nat. Sciences of Philadelphia, January 1860, p. 23.
Gebia carinicauda E. J. Miers, in: Report Zool. Coll. Voyage of H. M. S. "Alert", London 1884, p. 280.
Gebia carinicauda J. G. de Man, in: The Journal of the Linnean Society. Zoology. Vol. XXII, London 1888, p. 256.
Upogebia (*Upogebia*) *carinicauda* var. J. G. de Man, in: Mitteilungen aus dem Zoolog. Museum in Berlin. 12. Bd. 2. Heft 1927, p. 343—345.
Gebia barbata Strahl, in: Monatsber. K. Akad. Wissens. Berlin, 1861, p. 1062, figs. 7—9.
Gebia barbata A. Ortmann, in: Zoolog. Jahrbücher, Jena 1891, VI, 1. p. 54. Taf. I, fig. 8 and in: Jenaische Denkschriften, VIII, 1894, p. 22.

Stat. 34. March 27. Anchorage of Labuan Pandan, Lombok. 18 m. Two egg-laden females.
Stat. 58. April 25. Anchorage off Seba, Savu. Reef. Three males and four females, none of which are provided with eggs.
Stat. 60. April 27/28. Haingsisi, Samau Island, Timor. Shore. One egg-bearing female.
Stat. 127. July 20/21. Taruna-bay, Great-Sangir-Island. Reef. Two females, of which the larger with eggs.
Stat. 181. Sept. 5/11. Ambon. Reef. One male and two females, one of which with eggs.
Stat. 213. Sept. 26—Oct. 26. Saleyer-anchorage and Surroundings, including Pulu Pasi Tanette, near the North point of Saleyer-island. Reef. One egg-laden female.
Stat. 277. Jan. 9/11, 1900. Dammer. Reef. Two young females, one of which with eggs.

In 1905 when the *Thalassinidea* of this Expedition were worked out by me, Dr. P. Pappenheim, the successor of Dr. Hilgendorf as a Custos of the Crustacea at the "Königl. Museum für Naturkunde" in Berlin, has been so kind to compare for me two adult females from Stat. 58, which I had sent to him, with the five to seven type specimens of Strahl's *Gebia barbata*, at that time still extant in this Museum and to furnish me with useful information about them. The sent specimens did indeed belong to *Gebia barbata* Strahl, but Strahl's description proved to be quite inaccurate as I had already suspected to be the case.

In February 1925 the same specimens from Stat. 58 were sent by me to Dr. W. T. CALMAN of the British Museum, who with his well-known obligingness enabled me to examine myself one of the two females from the beach of Thursday Island which in 1884 were referred by MIERS (l. c.) to *Gebia carinicauda* Stimps.. The examination proved at once that our specimens did fully agree with the female from Thursday Island, so that they should be referred in my opinion to STIMPSON's species, with which *Gebia barbata* Strahl proved to be identical.

The 18 specimens, collected by the "Siboga", show the following characters. The rostrum is short, reaching but little beyond the eyepeduncles, its anterior margin obtuse and rounded; this margin is armed with four upstanding spiniform teeth, of which the two anterior are somewhat larger than the posterior, while the distance of either from the posterior tooth is one-third longer than the distance between the two anterior teeth. Lateral grooves shallow, diverging somewhat backward, bounded by a row of 14 or 15 acute teeth, the foremost of which is as large as the posterior tooth on the rostrum; then follow 5 teeth smaller, but equal, while the rest are still smaller and gradually decrease in size. Between the two grooves the gastric region bears a few other teeth or tubercles, the rostrum and the anterior part of the carapace are thickly clothed with setae, mostly implanted at the base of the tubercles and the scabrous surface extends in the middle to midway between the tip of the rostrum and the deep cervical groove.

A small spine on the antero-lateral margin of the carapace on a level with the eyes and just above the antennal peduncle; in some specimens this spine is rudimentary or wanting, so in a male and a female from Stat. 58 and in the two females from Stat. 127: it is in these specimens broken off.

Abdomen smooth, the furrows at some distance from the lateral margins of the terga are quite distinct and deep, at least in adult individuals. The lateral margins of the sixth segment are angularly emarginate in the middle, forming here a more or less distinct, triangular tooth; behind this tooth the lateral margins, that converge towards the straight posterior margin, appear only slightly concave (Fig. 6). Telson distinctly broader than long and broader anteriorly than at the straight posterior margin, the lateral margins converging towards the latter. The smooth upper surface is raised transversely at one-third or one-fourth its length from the anterior margin; this elevated part is rather sharply carinate and this slightly arcuate carina passes on each side into a lateral carina, that is situated not far from the lateral margins of the telson. That part of the upper surface which is bounded by these three carinae, slopes gradually downwards to the posterior margin, more abruptly towards the lateral borders; it is somewhat pitted and presents in the middle a narrow longitudinal furrow, that often not extends to the posterior margin. The shape of the lateral margins of the telson and also of the carinae is somewhat variable. In the female, long 35 mm., from Thursday Island of the British Museum (Fig. 6) the lateral margins are on the proximal half convex, on the posterior straight, running like a S, so likewise in specimens from Stat. 58 and others. In the female with eggs from Stat. 213 (Fig. 6*a*) the telson shows its greatest width along the two proximal fifth parts, the lateral margins being here straight, parallel, whereas the longer distal parts are slightly concave and converge to the posterior margin; in the egg-bearing female from Ambon (Fig. 6*b*) the left lateral margin

appears faintly convex, almost straight, the right slightly concave and in young specimens they are often nearly straight. The telson of the female from Thursday Island and of several specimens collected by the "Siboga" shows no doubt the typical form: in the female from Thursday Island the sixth segment (Fig. 6) is 4,5 mm. long, the telson 3,4 mm. long, 4,75 mm. broad. Of the uropods that closely resemble those of *Upog. major* (de Haan) the outer is triangular with arcuate anterior and arcuate apical border, with two carinae, the inner also triangular with the apical border straight and making a rather sharp angle with the thickened anterior and with one carina; the apical border of both uropods is finely denticulate.

In this genus the first abdominal segment of the male is destitute of appendages, whereas they are present in the female and uniramous. I will now call attention to the fact that in the three males from Stat. 58 and in the male from Ambon, in which the first pair of pleopods are wanting and the genital aperture on the coxae of the 5th pair of legs is distinct, the coxae of the 3rd pair possess also the genital aperture of the female.

The eggs of the largest female from Ambon which is 33 mm. long, have a diameter of 0,6—0,66 mm., whereas those of the young female from Stat. 213 that measures 22 mm. and of the still younger female from Stat. 34, that is 11,5 mm. long, are smaller, being only 0,5—0,55 mm. broad.

In the adult female from Ambon, 33 mm. long, the peduncles of the inner antennae (Fig. 6*c*) reach with half their terminal joint beyond the rostrum. The enlarged first joint, the lower margin of which bears a slender spine at the distal end and another much smaller acute tooth in the middle, appears almost as long as the third; the terminal joint, however, 1,2 mm. long and 0,26 mm. broad, is just 3-times as long as the second. STRAHL (l.c. p. 1063) describes the three joints of this peduncle as being of the same length ("gleich lang"), but, as Dr. PAPPENHEIM informed me, erroneously, because also in the types the third joint is nearly 3-times as long as the second. The second and the third joint are unarmed, but furnished with a few long hairs. The flagella, of which the inner is 2 mm. long, are a little shorter than the peduncle; the thicker flagellum with the olfactory filaments is composed of 18 segments, the segments broader than long, the barely longer, inner flagellum consists of 13 segments that are all furnished with long fine setae. In the larger female from Stat. 34, that is 19,5 mm. long, the terminal joint of the peduncle, $3^1/_2$-times as long as the second, is 0,82 mm. long and 0,18 mm. broad, i. e. $4^1/_2$-times as long as broad; the outer flagellum, 1,26 mm. long, is composed of 15 segments, that are broader than long, the other measures 1,4 mm. and consists of 12 segments. In the other female from the same Station and which is also egg-bearing, though only 11,5 mm. long, the terminal joint of the peduncle, $3^1/_2$-times as long as the second, is 0,5 mm. long and 0,12 mm. broad, 4-times as long as broad; the thicker flagellum, 0,86 mm. long, consists still only of 11 segments, the other, just as long, of 8. In a female without eggs from Stat. 58 that is 23 mm. long, the first joint of the antennular peduncle bears a quite small, sharp tooth at the distal end, but the small tooth in the middle is wanting; the third joint is 3-times as long as the second, but somewhat thicker than in the female from Ambon; the two flagella are each 10-jointed. In the egg-bearing female from Stat. 60, that measures 19 mm., the spine at the distal end of the first joint is also present, the third joint, 0,8 mm. long, is 4-times as long as the second; the thicker flagellum is composed of 14, the other of 13 segments. In the larger female with eggs,

long 19 mm., from Stat. 127 I observe under the microscope a quite rudimentary spine at the distal end of the lower border of first joint, the little tooth in the middle is wanting; the third joint, 0,8 mm. long and 0,2 mm. broad, is a little more than 3-times as long as the second. The thicker flagellum consists of 14 segments, the other of 10, but some are apparently broken off. These slight differences are, in my opinion, individual or depend on different age or habitat.

As regards the outer antennae the following should be remarked. Not only STRAHL's description of the antennal peduncle being composed of only three joints is erroneous, the figure 9 of his paper is moreover inaccurate, as Dr. PAPPENHEIM informed me, because the second joint, (i. e. the first of STRAHL) appears in this figure much too short in proportion to the following; the second joint is distinctly longer than broad, but in STRAHL's figure it appears barely as long as broad. In the larger female from Ambon, measuring 33 mm., the lower border of the second joint terminates (Fig. 6*d*) at the distal end in a slender acuminate, somewhat curved spine, which is already mentioned in STRAHL's description; at the distal end of the upper border a small movable scaphocerite is implanted, long 0,36 mm. and furnished with feathered hairs; this scaphocerite was not observed by STRAHL, for he remarks: "Vom Schuppenapparat findet sich durchaus nichts". It was observed by PAPPENHEIM in one type specimen, a female, whereas it was wanting in another, also a female: this fact agrees with my own observations, according to which the scaphocerite is wanting in some individuals. The following joint should according to HELLER (Die Crustaceen des südlichen Europa, Wien 1863, Taf. VI, fig. 12) be formed in *Upog. littoralis* (Risso) by two joints, for the greater part coalesced. This joint is 1,4 mm. long, a little longer than the preceding, 0,5 mm. broad just beyond the middle, 0,36 mm. at the base and nearly as much at the distal extremity; the terminal joint is 0,7 mm. long and just half as broad, the peduncle bears long feathered setae.

The female, long 23 mm., from Stat. 58 agrees with the just described one from Ambon; a small scaphocerite exists on the right peduncle, whereas it is wanting on the left! The spine at the distal end of the lower border is somewhat shorter. The female, long 19 mm., from Stat. 60 agrees also with the preceding specimens. The spine at the distal end of the lower border of the second joint is comparatively as long as in the adult female from Ambon, the sharp-pointed scaphocerite is 0,24 mm. long; the following joint is 0,9 mm. long, its greatest width, somewhat beyond the middle, 0,36 mm.; the last joint is 0,48 mm. long. The flagellum measures 6,6 mm., about 3-times the length of the peduncle. In the larger female with eggs, long 19 mm., from Stat. 127 I do not find a scaphocerite, but the spine on the second joint is present and for the rest this peduncle resembles that of the preceding specimens; the measurements of the joints are the same as those of the female from Stat. 60.

According to HELLER, ORTMANN and ALCOCK this genus should be devoid of an antennal scale, but BOAS has described its existence in *Upog. littoralis* (Risso), already in his work of 1880 (Studier over Decapodernes Slaegtskabsforhold, p. 105).

The legs of the 1st pair are equal. Ischium armed both in the male and in the female with one or two minute spinules on the distal half of the lower border: so there are two spinules on the ischium of the left leg of the female from Stat. 213, the proximal spinule being twice as large as the other. In a male, long 23 mm., from Stat 58 (Fig. 6*e*) this joint bears but one small sharp tooth, similar to those on the lower border of the merus

and in other specimens even this tooth is wanting. Merus with a small spinule near the distal end of the upper border, its lower margin armed along its whole length with 10 or 12 small acute teeth (Fig. 6*f*), that become smaller distally. As in *Upog. littoralis* (Risso) the carpus shows a longitudinal groove on the middle of its upper surface. The upper border is armed at the distal end with a strong acute spine (Fig. 6*g*) and between this spine and the articulation of the chela I observe six very small, acute teeth by means, of course, of a lens. A longitudinal row of hairs runs on the upper surface near the upper margin. The distal end of the lower border is dentiform, obtuse, and there is a sharp spine immediately behind it, which is a little smaller than that of the upper. The distal border of the inner surface that articulates with the chela, bears also a sharp spinule, placed a little nearer to the upper than to the lower border of the wrist. The chela is somewhat distorted, the palm which is nearly cylindrical and a little more than twice as long as high, ends into the slightly compressed, immobile finger, that measures about one fourth the length of the palm; near the base of this finger the lower border of the chela is armed with a sharp tiny spinule, which, on account of the distorsion of the palm, appears to be situated on the inner surface. The immobile finger (Fig. 6*h*) bears six small, subequal teeth on the proximal half of its cutting-edge and appears on each side smooth, shining and glabrous. The much stronger dactylus, a little more than half as long as the palm, is almost twice as long as the other finger; the dactylus is hardly incurved. The upper surface of the dactylus is smooth and glabrous, bounded both above and externally by a feeble longitudinal carina, along which setae are implanted; the lower surface is also smooth, not toothed, but both the inner and the outer border are finely crenulate. The outer surface of the palm bears two rows of setae, the upper begins in the middle of the proximal border that articulates with the carpus, the other at the proximal end of the lower border of the chela; both rows converge towards one another and unite on the outer surface not far from the tiny spinule with which the lower border is armed. Two other rows of setae occur near the upper border on the inner side of the palm.

The specimens of this collection, however, do not always fully agree with the preceding description. So e. g. the tiny spinule on the lower border of the palm does not exist in the female from Stat. 34, in the largest male from Stat. 58 (Fig. 6*e*), that is 23 mm. long, in the two females from Dammer and in a female long 20 or 21 mm. from Ambon. In this female from Ambon the spines of the carpus are also worn off or wanting and the tip of the dactylus is more curved inward.

In a female with eggs, long 25 mm., from Amboina, of my private collection, and also in the egg-laden female, long 19 mm., from Stat. 60, the legs of the first pair have a more slender form, the spine on the lower border of the palm is longer and the dactylus is also longer in proportion to the length of the palm (Fig. 6*f*). In the female from Amboina, indeed, the palm is 3,5 mm. long, the dactylus 2,3 mm. and the greatest height of the palm near the carpus is 1,5 mm.; in the typical male from Stat. 58, however, the palm is 4 mm. long, the dactylus 2 mm. and the palm is near the carpus 1,9 mm. high. In the female from Amboina the merus of this leg is 4 mm. long and 1,5 mm. broad in the middle; in the typical male this joint is 3,7 mm. long and 1,6 mm. broad. In one of STRAHL's type specimens, which Dr. PAPPENHEIM sent me for examination, the legs of the 1st pair had

the same slender form. This more slender probably individual variety may henceforth bear the name of gracilipes.

In the very young female with eggs from Stat. 34, long 11,5 mm., and also in the two females of small size from Dammer, the dactylus is still but little longer than the fixed finger, so that this specimen at first sight may be taken for a *Calliadne*. The larger female from Dammer, long about 18 mm., is provided with eggs, these eggs have a diameter of 0,55 mm.

The merus of the 2nd legs (Fig. 6*l*) bears also a small spinule near the distal end of its upper border, at the inner side, so that this spine is not visible on the outer side of the joint. The propodus has a stout shape; in the male, long 23 mm., from Stat. 58, this joint is 2 mm. long and 1,25 mm. broad, the dactylus is 1 mm. long.

As regards the following legs I will only remark that those of the 5th pair (Figs. 6*m*, 6*n*) are distinctly subcheliform, both in the male and in the female.

In the legs of the 1st pair the lower border of ischium and merus is fringed with long hairs, in those of the 2nd the lower margin of merus and propodus, but these hairs are not observed on the meri of the following legs. STRAHL describes them as present on the legs of the 1st, 2nd and 3rd pair, but, according to Dr. PAPPENHEIM, erroneously, as was proved also by the female of the variety gracilipes received from him.

The upper margin of the genital aperture projects in the female — and also in the males of this collection, in which such an aperture also occurs on the coxae of the 3rd pair of legs — as a more or less distinct acute tooth, mentioned already by STIMPSON and in some individuals there is a very small, acute tooth or tubercle on the inner side of the coxae of the second pair, so e. g. quite distinct in the ova-bearing female from Stat. 213.

The specimens show the following measurements. The female from Stat. 34 is 19,5 mm. long, the largest male from Stat. 58 23 mm., the largest female from the same locality 25 mm.; the ova-bearing female from Stat. 60 and the larger specimen from Stat. 127 are 19 mm. long, the egg-laden female from Amboina measures 33 mm., the two others being younger, the female from Stat. 213, finally, is 22,5 mm. long.

The youngest female, 18 mm. long, from Stat. 58 bears a Bopyrid in its left branchial cavity.

As regards *Upog.* (*Upog.*) *hirtifrons* (White) Dr. CALMAN informed me that the only still existing type specimen of this species in the British Museum is dry and a good deal shrivelled, the telson, in particular, being much distorted. There is, however, clear indication of a transverse ridge near the anterior end on the dorsal surface of the telson. The principal characters by which this species may be distinguished from *Upog. carinicauda*, are indicated in the key at p. 43 and a detailed description with figures was given by me in my work, entitled "A contribution to the knowledge of twenty-one species of the genus *Upogebia* Leach, 's Gravenhage 1927, p. 45, Pl. V, figs. 17—17*b*".

Geographical distribution: Hong-Kong (STIMPSON); Elphinstone Island, Mergui Archipelago (DE MAN); Luzon (STRAHL); Anchorage of Labuan Pandan, Lombok (DE MAN); Anchorage off Seba, Savu (DE MAN); Haingsisi, Samau Island, Timor (DE MAN); Taruna-bay, Great-Sangir-Island (DE MAN); Amboina (ORTMANN, DE MAN); Dammer (DE MAN); Saleyer-anchorage (DE MAN); Thursday-Island, Torres Straits (MIERS); Samoa-Islands (ORTMANN); Buka, Salomon-Islands (DE MAN).

4. *Upogebia* (*Upogebia*) sp. β. Pl. IV, Figs. 7, 7*a*.

Stat. 174. August 28/29. Waru-bay, north coast of Ceram. Reef. One female without eggs.

I do not venture to decide whether this specimen, which is 26 mm. long, should be considered as a different species or variety or as a deformed individual of *Upog. carinicauda*. Both fingers of the legs of 1st pair, especially the dactylus, are more strongly incurved (Fig. 7, 7*a*) and the outer border of the dactylus is more strongly denticulate, presenting five teeth, of which the first is somewhat larger than the others; along the proximal half of the immovable finger four small teeth are observed.

The first joint of the antennular peduncle is armed with a strong spine at the end of its lower border; the second joint is 0,28 mm. long and 0,34 mm. broad anteriorly, the third 0,94 mm. long and 0,2 mm. broad. The third joint appears thus slender, about 3-times as long as the second. The upper flagellum, 1,48 mm. long, is composed of 15 segments that are subquadrate or a little broader than long; the thinner flagellum is 1,64 mm. long and furnished with long hairs.

The second, third and fourth abdominal terga bear in the middle a low, obtuse, longitudinal carina which, narrow anteriorly, gradually widens towards the posterior margin of each segment, so that between this carina and the lateral sulci the upper surface appears slightly concave. There are anteriorly two carinae on the fifth segment, which, however, soon unite into one.

For the rest this specimen not really differs from *Upog. carinicauda*. The tooth on the antero-lateral margin of the carapace is wanting, like also the tiny spinule on the lower border of the palm of the anterior legs, but these differences occur sometimes also in *Upog. carinicauda*, as has been shown above.

5. *Upogebia* (*Upogebia*) *pugnax* de Man. Pl. V, Figs. 8—8*e*; Pl. VI, Fig. 8*f*.

Upogebia (*Upogebia*) *pugnax* J. G. de Man, in: Tijdschr. Nederl. Dierk. Vereeniging (2) Dl. IX, 1905, p. 600.

Stat. 311. Febr. 12/13, 1900. Sapeh-bay, east coast of Sumbawa. Up to 36 m. Bottom mud and sand. One female without eggs.

In its outer appearance this species bears some resemblance to *Gebicula exigua* Alcock from the Andaman Sea. The only specimen, unfortunately much damaged and incomplete, is 18,5 mm. long from tip of rostrum to end of telson, the carapace being 6,6 mm., the abdomen 11,9 mm. long. The rostrum (Fig. 8, 8*a*) is broadly triangular, flattened, with obtuse anterior extremity, 1,3 mm. long and just 1 mm. broad at its base; distinctly somewhat longer than broad, it measures just one-fifth the length of the carapace, when it is included itself. The lateral borders of the rostrum that extends as far forward as the limit between the middle and foremost third part of the penultimate joint of the antennal peduncle, are each beset with five, subacute, conical teeth that slightly increase in size in anterior succession; the first is placed at one-fifth the length of the lateral border from its base, the first four are equidistant, their distance from one another being a little shorter than that of the first tooth from the base, the fifth tooth stands a little farther from the fourth than the preceding, being placed somewhat nearer to the obtuse tip of the rostrum than to the

fourth tooth. The lateral borders of the carapace are each skirted with 8 or 9 subacute teeth that slightly decrease in size from before backwards; the foremost tooth has about the same size as the fourth tooth of the lateral border of the rostrum. The lateral margins of the gastric region are bounded at each side by a shallow, smooth, longitudinal groove; between both grooves the greater anterior half of the gastric region bears numerous, irregularly arranged, conical teeth that are directed forward and decrease in size backward. Seven or eight teeth are placed on the base of the rostrum, but farther forward they are wanting; the rostrum is closely covered with feathered hairs, on the gastric region these hairs become gradually shorter and finally disappear.

Somewhat nearer to the base of the rostrum than to the antennal peduncle the antero-lateral border of the carapace is armed with a single small spine at each side (Fig. 8*a*); this spine is directed obliquely upward and is barely as long as its distance from the base of the rostrum. The distance, 2,5 mm., between the cervical groove and the posterior margin of the carapace is little longer than one-third the whole length of the latter, the rostrum included. The abdomen, almost twice (exactly 1,8-times) as long as the carapace, resembles that of *Upog. carinicauda*, excepting the caudal fan. The third, fourth and fifth segments are nearly of the same length, the second and the sixth are somewhat longer, measuring about 2 mm. The first segment, less broad anteriorly than posteriorly, is very little shorter than the second. The abdomen shows its greatest width at the second segment and hence gradually narrows backwards; the second segment, indeed, is almost twice as broad as long, viz., 3,5 mm., the sixth one-third broader than long, namely 2,7 mm. Different from the preceding segments, the sixth tergum (Fig. 8*b*) appears somewhat convex from before backwards and its lateral borders bear a very small, sharp tooth in the middle.

The trapeziform telson is 1,6 mm. long in the middle line, distinctly shorter than the sixth segment; it shows its greatest width of 2,25 mm. a little behind the anterior border, being here just one and a half times as broad as long. The lateral margins converge slightly backwards and curve regularly into the posterior border, that is a little concave in the middle. Uropods distinctly longer than the telson. The basal joint is armed posteriorly with a small spine, that is directed backward. The triangular outer uropod is 2,5 mm. long and 1,4 mm. broad distally, little more than half as broad as long; its almost straight anterior border makes a right angle with the truncate distal margin, but the latter curves regularly into the inner border; being only 0,45 mm. broad at its base, the outer uropod appears distally three times as broad. The inner uropod is 2,3 mm. long, little shorter than the outer, its form is quite different. The inner uropod, indeed, shows its greatest width of 1,3 mm. a little behind the middle and hence it narrows regularly to the pointed, though obtuse, distal extremity; the anterior border presents an obtuse, dentiform process at one-third its length from the base and the slightly concave, distal border curves regularly into the inner. The distal border of the uropods, which is fringed with long feathered hairs, is moreover furnished with short, spiniform, movable setae.

The short eyepeduncles (Fig. 8*a*) reach as far forward as the antepenultimate joint of the antennal peduncle and to the middle of the rostrum, the distinctly faceted, brown cornea occupies the distal half of the peduncle.

Measured on the lower side of the body the inner antennae (Fig. 8*c*), almost half as

long as the carapace, prove to be 3,16 mm. long; the peduncle measures 2 mm., the flagella are 1,16 mm. long, of equal length, little more than half as long as the peduncle. The inner antennae reach with half the terminal joint of their peduncle beyond the tip of the rostrum. The first joint of their peduncle, that is 0,96 mm. long and the greater basal half of which is considerably thickened, is armed at the distal end of its lower border with a strong spine, that reaches almost to the distal end of the second joint, the shortest of all, being 0,22 mm. long. The slender terminal joint, 0,82 mm. long, is about 8-times as long as thick and bears some simple, outstanding setae. The thicker upper flagellum is composed of 14 segments; the first segment, 0,2 mm. long and 0,095 mm. thick, when looked at from above, is a little longer than the two following combined; the second segment is a little broader than long, the third as broad as long; the following segments, either as broad or a little broader than long, become gradually somewhat thicker until the eighth, which is 0,1 mm. long and 0,11 mm. thick and hence the flagellum tapers to its extremity; the last eight segments are beset with olfactory filaments. The other flagellum is half as thick and consists of 12 or 13 segments, that are generally longer than thick; the first is also somewhat longer than the following.

The much stouter antennal peduncle, 3 mm. long, reaches with its terminal joint beyond the distal end of the other; the antepenultimate joint is armed at the far end of its lower margin with a similar strong spine as that of the peduncle of the inner antennae; it is barely longer than the penultimate which is one and a half times as long as the terminal joint. The flagella are lost.

External maxillipeds slender, pediform, the two last joints and the merus are of subequal length.

Only the right leg of 1st pair (Fig. 8 *d*) is present. This leg, nearly 11 mm. long, almost as long as the abdomen, bears a close resemblance to that of *Gebicula exigua* Alcock (Indian Deep-Sea Macrura and Anomala, Calcutta, 1901, Pl. II, fig. 4). Ischium with a spine a little beyond the middle of its lower border. The merus, 3,5 mm. long and a little more than 3-times as long as broad, is armed with a single, forwardly directed spine on the upper border, not far from its distal extremity; the lower border bears a row of 8 or 9, small, equidistant spines, that are all of the same size, except the two foremost ones, which are very small; all these spines make right angles with the lower border. The conical carpus, 1,6 mm. long, almost half as long as the merus, is armed with four or five spines at the distal end of its upper border, two larger ones on the inner and three much smaller ones on the outer side of it; another spine stands on the middle of the upper border and the lower margin terminates also distally into a spine, that is a little smaller than the two large spines at the far end of the upper border. The propodus is a little distorted, so that the immobile finger is somewhat curved inward. Measured on its outer side, when the immovable finger is not visible, the propodus, measured between the carpal articulation and that of the dactylus, appears to be 2,8 mm. long, a little shorter than the merus; on the inner side, however, the propodus proves to be 3 mm. long from the carpal articulation to the extremity of the fixed finger. Not far from the carpus the outer surface shows its greatest breadth of 0,9 mm., about one-third of its length, and hence it slightly narrows towards the dactylus. The upper border bears five equidistant spines, that are directed forward and that become a little shorter distally; they are also somewhat

smaller than the large spines at the distal end of the upper border of the carpus. A single spine, nearly as large as those of the upper border, is placed on the middle of the concave lower border of the inner surface and at the base of the immovable finger the inner surface is somewhat broader than near the carpal articulation. The straight lower border of the outer surface (Fig. 8*d*) is finely serrate by 14 or 15 small, sharp teeth, one of which, in the middle, is a little larger than the rest. The immovable finger (Fig. 8*e*) that is 0,5 mm. long and the acute tip of which is slightly curved upward, bears seven or eight teeth that gradually become sharper towards the tip; a strong spine is placed on the distal border of the inner surface of the palm opposite to the middle of the articulation of the dactylus. The slightly curved dactylus is 1,9 mm. long, measuring about two-thirds the length of the propodus and being about four times as long as the immovable finger; as in the genus *Gebicula* the dactylus can be flexed at right angles with the propodus, but then it impinges against the other finger, which is not the case in *Gebicula*. The dactylus, flattened above and not carinate, gradually tapers to the tip and its finely crenulated, lateral margins are fringed with hair. The other joints are also fringed with long feathered hairs along their lower border.

Of the second pair only the right leg as far as the merus is present. The merus is 3,7 mm. long, a little longer than that of the first pair; it shows its greatest breadth of 0,77 mm. just beyond the second third part of its length and is thus about 5-times as long as broad. The merus bears a spine at the distal extremity of its straight upper border and the lower, that is fringed with long, feathered hairs as long as the merus itself, bears a small spine in the middle and perhaps still two at its base.

The genital aperture on the coxa of the third legs is small, 0,1 mm. long and a little less broad; just in front of it this joint bears a small acute spine, 0,12—0,13 mm. long. Except the coxae, the legs of the third and fourth pair are wanting.

The cylindrical legs of the fifth pair are subcheliform (Fig. 8*f*). The merus and the propodus show nearly the same length, the carpus is a little shorter. The immovable finger is rather short, measuring one-seventh the length of the whole propodus; it bears five spiniform teeth that grow gradually longer towards the still larger terminal claw. The slightly curved dactylus is about 3-times as long as the immovable finger, spatulate, narrowed in the middle and the lateral margins of the larger distal half bear spatuliform spines that increase in length towards the tip; the dactylus is furnished with long hairs and the distal end of the propodus is covered with a brush of hair.

The abdominal appendages of the first segment are wanting, perhaps lost. Those of the four following pairs are biramous, one ramus lanceolate, pointed, 3,3 mm. long, the other elliptical, much smaller, measuring little more than one-third the length of the larger; both are fringed with long feathered setae.

This specimen bears a *Sacculina*, which is attached in the middle line of the lower surface of the third segment of the abdomen near the articulation with the second.

6. *Upogebia* (*Upogebia*) *ceratophora* de Man. Pl. VI, Figs. 9—9*g*.

Upogebia (*Upogebia*) *ceratophora* J. G. de Man, in: Tijdschr. Nederl. Dierk. Vereeniging (2) Dl. IX, 1905, p. 602.

Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Up to 36 m. Bottom: coral sand; near the shore mud. One female, without the legs of first pair and without eggs.

Stat. 58. April 25. Anchorage off Seba, Savu. Reef. One specimen, bearing one of the legs of the first pair.

A species of small size, unless the two specimens are young, related to *Upog. pugnax* de Man and *Upog. fallax* de Man. The specimen from Stat. 53, though unfortunately missing the legs of the anterior pair, will first be described, because it is the larger of the two. This specimen is 10,56 mm. long from tip of rostrum to end of telson, viz., to the end of its lateral lobes, the posterior margin of the telson being namely deeply emarginate. The carapace is 3,96 mm. long, the abdomen 6,6 mm. The triangular rostrum, flattened above and somewhat narrowed at its base, is 0,9 mm. long, i. e. somewhat longer than one-fifth the whole length of the carapace; it shows its greatest breadth of 0,58 mm. immediately in front of the constricted base, so that it appears just one and a half times as long as broad. The rostrum that regularly narrows forward and the tip of which is obtuse, is armed on each lateral border with seven conical, subacute teeth that are equidistant and that slightly decrease in size backwards. In a lateral view (Fig. 9*a*) the rostrum proves to be 0,22 mm. high in the middle, one-fourth its length. Its apparently sharp or carinate, lower margin ends anteriorly in a single, slender, curved and acuminate spine, that is first directed obliquely downward and then forward. It is from this spine that the name of *ceratophora* is derived. The distance, 1,52 mm., between the cervical groove and the posterior border of the carapace, is a little larger than one-third the length of the carapace, rostrum included. The nearly parallel lateral margins of the gastric region, which are fringed with feathered hairs, carry 8 or 9 acute teeth, that decrease in size from the foremost to the posterior; the foremost tooth is as large as the anterior pair on the rostrum, conical, acute and directed outward. The distance between the tips of the teeth of the anterior pair from one another measures 0,84 mm., just as long as the length of the rostrum. On each side the gastric region bears a longitudinal row of 10 or 11 small teeth, that, beginning near the hindmost tooth of the rostrum, curves first inward, soon, however, turns outward; hence the two rows diverge from one another, continuing until near the cervical groove. One observes, moreover, on the proximal half of the rostrum, on either side of the middle line, another longitudinal row of 9 or 10 small teeth; these two rows run parallel with one another and for a short distance continue on to the gastric region, between the two first described rows. The teeth of these four longitudinal rows, on the gastric region and on the rostrum, are low, small and directed forward; the rows are fringed with feathered hairs as on the lateral margins of the rostrum and the gastric region. A few feathered hairs are implanted on the hinder edge of the cervical groove near the middle line.

As in *Upog. monoceros* the antero-lateral border of the carapace bears a very small tooth or spine just above the insertion of the antennal peduncle, but the other spine of that border at the level of the eyepeduncle is smaller than in *Upog. monoceros*, being as small as the other. A similar, small spinule stands, as in *Upog. monoceros*, on the hinder edge of the cervical groove, immediately behind and below the last tooth on the lateral margin of the gastric region and two, also of the same size, on the lateral surface of the carapace above the cervical groove.

The carapace is as long as the distance between its posterior border and the middle of

the fifth segment of the abdomen and the abdomen appears a little more than one and one half times as long as the carapace. The abdomen shows its greatest breadth at the posterior part of the second segment; hence it narrows slightly until the sixth, whereas the sixth segment and the telson are much less broad. The second segment is 1,04 mm. long, measured in the middle line; its lateral margins, slightly concave in the middle, diverge somewhat backward, so that it presents its greatest width of 1,72 mm. posteriorly; this segment appears a little more than one and one half times as broad as long. The first segment is one-fifth shorter than the second; posteriorly it is 1,24 mm. broad, anteriorly little more than half as much and at about one-third its length from the anterior border it is suddenly constricted, being here 0,75 mm. broad. The third to fifth segments are of subequal length, being distinctly shorter than the second. The nearly quadrate sixth segment (Fig. 9*b*) is 1,2 mm. long, slightly longer than the second and the longest of all; its lateral margins bulge out laterally just in front of the basal joint of the uropods, so that it presents here its greatest width of 1,36 mm., whereas this joint is 1,16 mm. broad anteriorly; the sixth segment appears therefore posteriorly a little broader than long and its hind border is slightly arcuate. The pleura of the second to fifth segments are rounded posteriorly, those of the second to fourth overlap one another.

Like in all the species of this genus, the caudal fan is characteristic. The telson is just 1,06 mm. long (Fig. 9*b*) until the posterior end of the rounded, lateral lobes of its posterior margin, which is deeply emarginate in the middle; it presents its greatest width of 1,16 mm. at one-fifth its length from the posterior end. The telson, a little shorter than the sixth segment and as long as the second, is nearly quadrate; its slightly convergent lateral edges bear at their posterior extremity a very small spinule before passing into the rounded lobes of the posterior margin; these lobes are fringed with long, feathered setae, above which other simple setae are inserted. A few hairs on the upper surface.

When directed backward, both uropods project beyond the telson. The basal joint bears posteriorly a small spinule, directed backward and outward. The outer uropod, 1,54 mm. long, is one and a half times as long as the telson; it appears obovate, narrow at its base, and gradually widens until at one-third of its length from the regularly rounded distal end; it shows here the greatest width of 0,74 mm., so that it is just half as broad as long. The outer uropod is fringed with long, feathered hairs, the rounded distal end, moreover, with shorter spiniform setae that are ciliated at the distal half. The triangular inner uropod is 1,42 mm. long, a little shorter than the outer ramus, 0,64 mm. broad in the middle, being a little more than twice as long as broad; the nearly straight anterior margin appears obtusely angular near the base, whereas the slightly concave, inner border curves regularly into the straight distal margin; the distal extremity is obtuse. Except the anterior border that carries a few, distantly placed, short hairs, the inner uropod is fringed with feathered hairs whereas one observes on the distal border and on the obtuse, distal extremity moreover shorter, not ciliated setae. A few long setae are implanted on the upper surface of the outer uropod near the anterior border, two also on that of the inner and four or five long setae are inserted on the longitudinal midrib of the latter.

The eyepeduncles reach barely to the middle of the rostrum and are rounded distally; the distinctly faceted brown cornea occupies the distal half of the peduncle.

The internal antennae, measured on the lower side of the body, so that they are entirely visible, proved to be 2,03 mm. long, the peduncle 1,27 mm., the flagella 0,76 mm.; they extend with the flagella beyond the tip of the rostrum and are half as long as the carapace. The first joint of the peduncle, 0,66 mm. long, is considerably thickened, the distal fifth part excepted; one observes at the distal end of the lower border a sharp, slightly curved spine, that reaches beyond the middle of the second joint. The two other joints are, together, just as long as the first. The second joint is 0,16 mm. long and half as thick; the terminal joint, 0,45 mm. long, is nearly 6-times as long as broad; the joints of the peduncle carry a few simple hairs. The upper, thicker flagella measure not yet two-thirds the length of the peduncle. The thicker flagellum of the left antenna is composed of 9 segments; the first and the second segment are equal, about one and a half times as long as thick, viz., 0,1 mm. long and 0,07 mm. thick, the two following segments are a little shorter and just as long as thick, the fifth resembles the first, the sixth, seventh and eighth are longer than thick, the terminal segment is conical; the thicker flagellum of the right antennule consists of 8 segments, because the third and the fourth are coalesced. The lower flagellum is little shorter, but much thinner, its thickness being only one-third that of the other; it is composed only of 6 segments, that are slender, longer than thick; the fourth segment is a little longer than the rest, 0,16 mm. long and 0,028 mm. thick, about 6-times as long as thick.

In a lateral view of the body the external antennae appear to be 8,16 mm. long, the peduncle measuring 1,72 mm., the flagella 6,44 mm.; they are twice as long as the carapace and little shorter than the body. The eyepeduncles, the first joint of the peduncle of the inner and the antepenultimate joint of that of the outer antennae reach equally far forward. The basal joint bears a small spine at the distal end of its lower margin. The antepenultimate joint, long 0,54 mm., of the peduncle bears at the distal end of its upper margin a, probably movable, small scaphocerite that ends in a small spine, directed forward; the lower border, fringed with feathered hairs, is armed with a spine near the distal end, almost of the same size as that on the basal joint of the antennular peduncle. The penultimate joint, a little longer, viz., 0,62 mm., is also furnished with long feathered hairs and its nearly straight lower border bears a slender spine, of the same size as that of the antepenultimate joint, at one-third of its length from the distal end and placed more forward than in *Upog. monoceros*; the terminal joint is half as long as the penultimate and bears also a few long setae. The flagellum, almost 4-times as long as the peduncle and more than one and a half times as long as the carapace, consists, the right of 52, the left of 53 segments, that are all longer than thick, except the very short first segment which is a little broader than long; the other segments are of unequal length and carry a few hairs near their distal end, which on some segments are long, on other ones short.

External maxillipeds slender, pediform, reaching a little beyond the tip of the rostrum and having their lower margin closely fringed with plumose hairs; the obtuse last joint is a little shorter than the propodus.

The legs of the first and second pair are wanting, therefore of the other specimen the thoracic legs will be described. This specimen is a little smaller, only 8,5 mm. long, the carapace (rostrum included) 3,2 mm., the abdomen 5,3 mm.; the tip of the rostrum is 2 mm. distant from the cervical groove, the latter 1,2 mm. from the posterior margin of the carapace. The rostrum

is 0,7 mm. long, its lateral margins armed each with seven teeth. The second segment of the abdomen is 0,84 mm. long, posteriorly 1,4 mm. broad; the sixth is 0,94 mm. long and posteriorly 1,12 mm. broad, the telson, finally, measured to the end of the lateral lobes, 0,8 mm. long.

Of this specimen the left leg of the first pair (Figs. 9*c*—9*g*) [the other leg is lost] is 6 mm. long, one and one-half times as long as the carapace and reaches with the chela and the greater part of the carpus beyond the tip of the rostrum. The short ischium bears a small spinule near the distal end of its lower border. The merus, 1,8 mm. long and 0,44 mm. broad in the middle, is 4-times as long as broad; its upper border bears a small spine (Fig. 9*e*), directed forward, near the distal end. The straight lower border of the outer surface is armed with five or six acute teeth that are a little smaller than the spine on the upper, of equal size (Fig. 9*f*) and nearly equidistant, whereas the lower border of the inner side is fringed with long plumose hairs. The carpus, barely half as long as the merus and thickening somewhat distally, is armed with several acute spines (Figs. 9*c*, 9*d*). On the inner side of the upper border of this joint four spines are observed, that gradually grow longer from the first or proximal which is very small, to the fourth at the distal end, which is almost half as long as the joint and the largest of all the carpal spines; on the outer side of the upper border three smaller spines occur, of which the middle one is placed a little more outward than the two others, these spines grow also longer from the proximal to the distal one. A spine of moderate size exists on the distal border of the inner surface, midway between the upper and the lower border (Fig. 9*d*), a very small one, finally, at the distal end of the lower border. The propodus carries at its distal end a pointed immovable finger that is directed inward. The outer surface of the propodus is 1,3 mm. long from the carpal articulation to that of the dactylus, i. e. about two-thirds the length of the merus; not far from the carpal articulation the outer surface shows its greatest width of 0,36 mm. and hence it narrows a little towards the distal end, where it is 0,27 mm. broad. The slightly concave, lower border of the outer surface bears three very small spinules, one near the proximal, one at the distal end and one in the middle. The propodus is armed above with several strong spines, arranged as follows. Six spines are placed on the outer side of the upper border, the first at the proximal and the sixth at the distal end are a little smaller than the four others and they are nearly equidistant; five other spines are placed on the inner side of the upper border, the first and the fifth are very small, the others as large as those on the outer side; three strong spines are placed between both rows, the middle one of which is placed just behind the middle of the upper border. A row of long plumose hairs occurs on the inner side of the propodus from the proximal end of the lower border obliquely upward and several long, plumose hairs are implanted above between the spines. The pointed fixed finger, which is directed obliquely downward and inward, does not reach beyond the articulation of the dactylus; the slender, distal half is unarmed, but at its base this finger (Fig. 9*g*) bears 5 or 6 small sharp teeth, that increase in size from the proximal to the distal one. The nearly straight dactylus is 0,98 mm. long, little shorter than the propodus, and, when flexed at right angles with it, impinges against the immobile finger; it is flattened above and narrows regularly towards its pointed tip. The lateral borders are fringed with simple stiff setae, which, rather long near the base, gradually become shorter

towards the tip; it carries a few minute teeth above near the base, or perhaps are the lateral borders finely denticulate.

The right leg of the second pair (the left is wanting) is about 5 mm. long, little shorter than that of first. The coxae bear several, four or five, small, acute teeth or spines on their inner side, placed near one another. The slender merus is 1,8 mm. long, just as long as the merus of the first legs and slightly widens from its proximal extremity where it is 0,22 mm. broad, until near the distal where it is 0,35 mm. broad; in the middle the merus has a width of 0,32 mm., so that this joint is 6-times as long as broad. The upper border ends distally in a small spinule and the lower, fringed like that of carpus and propodus on its inner side wide long plumose hairs, bears in the middle four or five very small, equidistant spinules. The carpus, angularly curvate at its base, rather slender and somewhat thickening distally, is just half as long as the merus; its upper border bears a short spine not far from the distal end and another, a little smaller, just beyond the middle; the lower border terminates at its distal end in a still smaller spinule directed forward. The width of the carpus at its distal end is just one-third of its length. The quadrangular propodus, 0,8 mm. long and 0,33 mm. broad in the middle, is barely shorter than the carpus and $2^1/_2$-times as long as broad; it is in the middle little broader than proximally, but at the distal end it is much less broad. The upper border and the distal half of the outer surface are furnished with feathered hairs like the lower border. The dactylus, 0,65 mm. long, 0,16 mm. broad at its base, is a little shorter than the propodus, 4-times as long as broad at its base, and narrows gradually to the pointed extremity; it is fringed with feathered hairs, especially the upper border.

Like those of the second, also the coxae of the third pair of legs, that are 4 mm. long, are armed internally with six or seven, small, acute spines. The merus, 1,4 mm. long, 0,19 mm. broad in the middle, is slender, nearly 7-times as long as broad; it becomes gradually somewhat wider distally, the upper border is unarmed, but the lower bears four, very small, equidistant spines. The carpus, just half as long as the merus, shows its greatest breadth of 0,24 mm. near the distal end, this breadth being a little more than one-third of its length; the unarmed, upper border is furnished with feathered hairs distally, the lower ends in a quite small spinule. The propodus, 0,6 mm. long and 0,22 mm. broad in the middle, is little shorter than the carpus and the greatest breadth of this joint in the middle, the propodus being distinctly less broad at both articulations, is little more than one-third its length; the curvate upper and the straight lower border are fringed with feathered setae, that occur also on the outer surface. The terminal joint, 0,66 mm. long and 0,1 mm. broad in the middle, is not shorter than the propodus and has a sharp tip, that is slightly upturned; the upper margin is fringed with rather long, plumose setae, the lower carries on its distal half five spiniform, movable teeth; a few small spinules exist on the proximal half of the outer surface near the upper border.

The legs of the fourth pair resemble those of the third, but are a little shorter; the pointed dactylus bears four spiniform teeth on its lower margin, close by one another, at some distance from the tip.

The legs of the last pair, about 2,7 mm. long, are subcheliform; merus, carpus and propodus, exclusive of the immovable finger, are of subequal length. The propodus is 0,86 mm. long until the pointed extremity of the fixed finger, that bears 2 or 3 small teeth, and 0,7 mm.

without it; the propodus is 0,14 mm. broad, 6-times as long as broad. The slightly curvate, regularly tapering dactylus is almost twice as long as the fixed finger and bears 4 small teeth near the pointed tip. This leg is a little setose, especially the last joints.

The genital aperture of the female from Stat. 53 is very small; immediately behind it occurs a spine, directed downward.

Abdominal appendages of the 1st pair were not observed, perhaps are they lost. Those of the 2nd—5th pair are in the female biramous, the two rami foliaceous, fringed with long, articulated, ciliated hairs; the larger, 1,9 mm. long, lanceolate, pointed, presenting its greatest width of 0,38 mm. somewhat nearer to the base than to the tip, and thus 5-times as long as broad; the other, much smaller, is elliptical, obtuse, 0,58 mm. long, 0,16 mm. broad in the middle, about 4-times as long as broad.

7. *Upogebia* (*Upogebia*) *monoceros* de Man. Pl. VI, Fig. 10; Pl. VII, Figs. 10*a*—10*d*.

Upogebia (*Upogebia*) *monoceros* J. G. de Man, in: Tijdschr. Nederl. Dierk. Vereeniging (2) Dl. IX, 1905, p. 603.

Stat. 4. March 9. Lat. 7° 42′ S., long. 114° 12′.6 E. Anchorage off Djangkar (Java). 9 m. Bottom coarse sand. One egg-laden female.

The Indo-pacific is inhabited only by two species of this genus, in which the lower border of the rostrum is armed with one single spine, viz., *Upog. ceratophora* and the present species.

The egg-laden female is 13,75 mm. long, the carapace, rostrum included, being 4,75 mm. long, the abdomen 9 mm. The carapace which is 2,4 mm. broad at the level of the branchial regions, narrows considerably forward, so that it is 1 mm. broad anteriorly. The rostrum, inclined a little downward, is triangular or rather hastate, being slightly narrowed at its base; it is 1,04 mm. long, a little more than one-fifth the length of the carapace and 0,85 mm. broad, just in front of the constriction at the base, appearing thus a little longer than broad. The rostrum which is rather thick, namely 0,32 mm., is armed on the lower side, at one-third its length from the obtuse tip, (Fig. 10*a*) with a slender, pointed spine that is somewhat curved forward and reaches to the tip; the lower surface of the rostrum is a little hairy above the eyepeduncles and a few short setae are implanted at either side of the lower median carina, as well before as behind the spine. There are no teeth on the tip nor on the upper surface, but one observes 6 or 7 small, subacute teeth near each lateral border. The lateral margins of the gastric region are armed with 14 or 15 small, sharp teeth that increase a little in size anteriorly, so that the foremost are slightly larger than the rest; the foremost tooth on the left side is just 1 mm. distant from that on the right, so that the carapace is 1 mm. broad anteriorly. Like in other species a furrow runs along the denticulated, lateral borders of the gastric region and this rather broad furrow reaches until the cervical groove, becoming gradually more shallow posteriorly; the lateral borders of the rostrum, continued on to the gastric region, curve at first slightly inward, then, running parallel with the lateral borders of the latter, they slightly diverge backward, bearing anteriorly 6 or 7 small, subacute teeth. The whole upper surface of the rostrum is grown over with plumose setae that are 0,25 mm. long, almost as long as the rostrum is thick and each seta is implanted in a small, circular pit; the hairs are continued on to the gastric region, but a narrow median stripe that begins just behind the middle of the rostrum

and that gradually widens backward, is smooth and glabrous, like also the posterior fourth part of the upper surface of the gastric region; the sublateral furrows are also glabrous, but the denticulate, lateral margins are hairy. The *Liniae thalassinicae* are distinct and the rather deep, cervical groove is situated at a little more than one-third the length of the carapace from its straight posterior margin; on the upper surface a few setae are implanted on the hinder edge of the cervical groove.

The lateral walls of the carapace (Fig. 10*a*) are armed with a sharp spine, 0,12 mm. long, just near and below the cervical groove, situated at the level of the last tooth of the lateral borders of the gastric region. The antero-lateral border of the carapace is armed, midway between the rostrum and the antennal peduncle, with a sharp spine, which is directed forward and placed in the same horizontal line as the other equally long spine near the cervical groove, i. e. at the same distance below the lateral borders of the gastric region. The antero-lateral border bears, moreover, 2 or 3 extremely small, sharp teeth near the insertion of the antennal peduncle, but these teeth are indistinct on the left side and may easily be overlooked.

Abdomen twice as long as the carapace. The first segment, measured in the middle line, is 1,14 mm. long and, the pleura included, 2 mm. broad posteriorly; it is narrowed anteriorly, at one-fifth its length from the slightly concave, anterior border and here 1,2 mm. broad. The pleura that are separated from the terga by a sharp carina, are very narrow, almost linear in their anterior half and they widen somewhat on their posterior; the long lower border is straight and makes an obtuse angle with the much shorter posterior margin. The second segment, 1,5 mm. long and 2,36 mm. broad posteriorly, is one and one-half times as broad as long; the pleura, also separated by a carina from the terga, are elongate, 3-times as long as broad and obtuse at both extremities. The three following segments are shorter than the second, subequal in length, and slightly decrease in breadth; the pleura of the third are separated from the tergum by a concave carina that reaches to the middle, in the two following segments it becomes gradually shorter; the pleura of the 3rd—5th segments become gradually higher, so that those of the fifth are nearly as long as high. The sixth segment (Fig. 10*b*), a little convex longitudinally, is precisely as long as the second, viz. 1,54 mm.; it is distinctly broader than long, being 1,84 mm. broad posteriorly; the slightly curved, posterior border bears, as usual, a tuft of setae near the external angles.

The telson, measured in the middle line, proves to be 1,16 mm. long, shorter than the sixth segment and as long as the first; it presents its greatest width of 1,44 mm. at one-fourth its length from the anterior border and appears thus one-third broader than long. The lateral margins are behind the greatest width straight and converge a little backward; the posterior margin is slightly concave. The lateral margins bear just there where they begin to curve into the rounded lobes of the posterior border, i. e. at one-fifth the length of the telson from the latter, a small movable spinule, 0,03 mm. long. The rounded lobes of the posterior margin, which, as in other species, is fringed with long, plumose hairs, are beset with still longer, plain setae that measure 0,9 mm.; quite anteriorly the upper surface presents, not far from the lateral margins, at each side a transverse row of 4 or 5 short setae, between them in the middle a transverse row of 6 or 7 setae and a few exist behind them near the lateral borders.

The uropods extend, when directed backward, with half their length beyond the telson. The basal joint is armed posteriorly on the outer border with a sharp spine, directed backward.

The outer uropod, 1,8 mm. long, appears obliquely ovate, because the slightly arcuate anterior border is shorter than the posterior, while both regularly curve into the arcuate apical margin; it shows its greatest width of 1 mm. at one-third its length from the apical margin, being here 3-times as broad as at its base, and appears therefore almost twice as long as broad. The apical border is thickly skirted with spiniform bristles of various size and length and the whole limb is fringed, like the inner uropod, with long feathered setae; a few long setae are implanted on the upper surface near the anterior border; of the two midribs the posterior is one and a half times as broad as the anterior and reaches almost to the apical border, the other is a little shorter. The inner uropod, 1,65 mm. long and 0,86 mm. broad, is almost twice as long as broad, it is triangular or rather rhomboid, the anterior border is straight and the much shorter posterior curves regularly into the apical margin, which is about as long as the posterior, while the antero-external angle is obtuse; the apical border is adorned with strong, spiniform bristles, between which much longer, plain setae are implanted; a few long setae are also observed on the longitudinal midrib.

The eye-peduncles that are fully covered and concealed under the broad rostrum, are short, extending only along the proximal third part of the rostrum; the well-faceted cornea is distinctly pigmented and occupies half the length of the peduncle.

The internal antennae are 2,3 mm. long, half as long as the carapace, and their peduncle that reaches barely beyond the rostrum, is 1,3 mm. long. The first joint, measured on the lower side of the body, is 0,7 mm. long and considerably broadened, except somewhat more than the distal fifth part; the broadened part is 0,3 mm. broad, the distal part half as much. There is a strong, sharp spine, 0,18 mm. long, at the distal end of the inner border of the lower surface, that reaches almost to the distal end of the second joint. The 2nd joint is 0,16 mm. long, one and a half times as long as thick, distinctly less thick than the distal end of the 1st joint. The slender third joint is 0,44 mm. long, almost 3-times as long as the second; it is 0,073 mm. thick just behind the middle, a little thicker at the base and 0,113 mm. at the distal extremity, appearing thus 6-times as long as thick. The thinner lower flagellum, which is 0,04 mm. thick, is 1 mm. long and a little shorter than the peduncle; it is composed of 9 segments, that are all slender, much longer than thick: so e. g. is the 2nd segment, which is a little longer than the 1st, 0,1 mm. long, the 7th segment 0,15 mm., the 9th or last 0,12 mm. and all are 0,04 mm. thick. The segments bear some long setae at their distal end. The upper flagellum is a little shorter, but twice as thick, viz., 0,08 mm., and consists of 9 or 10 segments — it remained uncertain whether the last segment was formed by a smaller terminal and longer penultimate segment or not. The right flagellum does not fully agree with the left; in the right the 1st segment is 0,16 mm. long, in the left 0,1 mm.; the 2nd segment is 0,13 mm. long in the left, 0,1 mm. in the right and so a few other slight differences exist.

The length of the external antennae could not be ascertained, because the flagella are wanting. Measured in a lateral view the peduncle proves to be 1,85 mm. long; the 5th or terminal joint extends beyond the tip of the rostrum. The scaphocerite, placed (Fig. 10*a*) on the upper outer side of the articulation between the penultimate joint and the antepenultimate, that is 0,55 mm. long and the outer side of which narrows somewhat distally, ends anteriorly in two, small, sharp spinules of equal size; the lower border of the antepenultimate joint is armed near the

distal end with a small spine, that is 0,1 mm. long and it is fringed near the outer side with long ciliated hairs. The penultimate joint, which is slightly narrowed at its base and about 3-times as long as thick, is 0,68 mm. long and its lower border bears, not far from the proximal end, a spine, that is barely longer than that of the antepenultimate joint; between this spine and the distal extremity a few setae are implanted, two of which are 0,5 mm. long, the rest shorter; it is grown over on its upper surface with numerous plumose setae; the last joint, finally, is just half as long as the penultimate and also hairy.

The external maxillipeds are narrow, pediform and thickly fringed on their inner border with ciliated setae. Measured on their outer margin the ischium appears to be 0,5 mm. long, the merus a little longer, 0,56 mm., the carpus very short, 0,4 mm. long, the propodus 0,52 mm. long and 0,28 mm. broad, whereas the tapering dactylus is 0,62 mm. long, slightly longer than the propodus and 0,22 mm. thick, almost 3-times as long as thick.

The legs of the first pair (Fig. 10*c*) reach with nearly the whole carpus beyond the rostrum. The coxae bear a strong, slender spine at the distal end of their inner border. There is a small spinule near the distal end of the lower margin of the short ischium. The merus of the right leg is 2,4 mm. long and 0,74 mm. broad in the middle; slightly narrowing towards both extremities, it appears 3-times as long as broad. At one-sixth its length from the distal extremity the upper border is armed with a slender, rather feeble spine, which is directed forward, and four spines nearly of the same size are placed on the proximal half of the lower border of the outer surface, whereas that of the inner is fringed with long ciliated hairs which are 1,8 mm. long. These four spines are slightly curved backward and decrease a little in length from the 1st near the proximal extremity to the 4th; the 1st is a little farther distant from the 2nd than the following and on the merus of the left leg one observes a small fifth spinule between the 1st and the 2nd. The carpus is 1 mm. long, barely half as long as the merus and distally three-fifths as thick as long; it is armed above with several spines of unequal length. The longest of all is placed at the distal end of the inner border of the upper surface (Fig. 10*d*) and is 0,75 mm. long, three-fourths the length of the carpus; this slightly curved spine is directed forward and inward; behind this spine is placed another which is half as long, about on the middle, and behind this a third, half as long as the second, near the proximal extremity, all on the inner border. A strong spine, though distinctly shorter than the first described, occurs at the distal end of the inner surface of the carpus, just below the first; five or six smaller spines are placed on the upper surface near the spines of the inner border and on the distal border that articulates with the chela. A spine of medium size, which is curved forward, exists at the distal end of the lower border; one observes on the outer surface in the middle a longitudinal row of setae and an arcuate hairy ridge near the lower border. The propodus of the right leg, measured on the middle of its outer surface, appears to be 1,7 mm. long, a little more than two-thirds the length of the merus; the outer surface presents its greatest breadth of 0,7 mm. at one-third its length from the carpal articulation, so that it is $2^1/_2$-times as long as broad and it narrows somewhat proximally and distally. The lower margin of the outer surface is straight, unarmed and setose, the setae mostly ciliated; the curved, upper border of the outer surface is armed with eight (in the left leg with nine) equidistant spines, that are curved forward, the first at the proximal,

the foremost one not far from the distal extremity. A strong, compressed spine on the distal end of the inner surface of the propodus and curved inward (Figs. 10*c*, 10*d*) functions as immovable finger; it is attached with a broad base on the distal fifth part of the propodus and proves to be 0,35 mm. long, when measured along its, concave and entire, prehensile edge (Fig. 10*d*). Midway between this fixed finger and the proximal end of the lower inner border of the propodus one observes another spine; this spine is a little longer than the immovable finger, with which it runs parallel, being also curved inward and forward, but it has a slender shape, because this spine is only half as broad at its base as the fixed finger. There is on the middle of the inner surface of the propodus a longitudinal row of long plain setae and there are in the middle of this row one or two small spinules; several long setae are implanted at the distal end of the upper border of the propodus in a transverse line; the outer surface is grown over with very short, plumose setae, between which a few longer, plain hairs are observed, two transverse rows of ciliated setae exist on the distal border of the outer side and there are also a few hairs on the inner surface between the row of setae and the upper border. The slightly arcuate, unarmed, tapering dactylus is 1,3 mm. long and 0,35 mm. broad at the base of its outer surface, measuring three-fourths the length of the propodus; setae are implanted on each lateral margin of the flattened, upper surface which is itself glabrous and these setae become gradually shorter towards the tip; another row of setae exists just between them and the lower surface which is also setose in the middle line.

The slender merus of the second legs is 2,4 mm. long, nearly as long as that of the first pair and 4-times as long as broad, presenting its greatest width of 0,6 mm. at one-third of its length from the distal end; it narrows a little towards the proximal extremity. The straight upper border bears a slender, small spine, directed forward, near the distal end; the slightly arcuate lower border bears a similar spine near the proximal extremity and another much smaller spinule at one-third the length of the merus from the base; there are also two minute tubercles near one another on the middle of this border, that carries some short hairs, whereas it is fringed on its inner side with very long, ciliated setae. The carpus, angularly curved at its base, is 1,2 mm. long, just half as long as the merus and 0,5 mm. thick distally, $2^1/_2$-times as long as thick; the upper margin is armed with four spines that are curved forward and that from the rather small first spine on the middle grow gradually longer to the fourth at the distal end; a similar spine occurs at the distal end of the lower border. The quadrangular propodus is 1 mm. long, a little shorter than the carpus and almost twice as long as broad, presenting its greatest breadth of 0,56 mm. in the middle; both margins, of which the lower is straight, the upper slightly arcuate, are fringed with long ciliated hairs, which on the lower are very long; the setae are continued on the outer surface, except just in the middle. The dactylus, 0,92 mm. long, little shorter than the propodus and flattened above, resembles that of the first pair and presents the same rows of setae.

The circular genital apertures on the inner side of the coxae of the third pair are large, the anterior border of this surface is armed with 5 or 6, very small spinules. The slender merus is 2 mm. long and 0,46 mm. broad, 4-times as long as broad; the upper border has a small spinule near the distal end, the setose lower border bears two similar spinules, of which the anterior is a little larger than the other and situated at two-fifths the

length of the merus from the proximal end. The carpus is 0,9 mm. long and 0,42 mm. thick, twice as long as thick and half as long as the merus; both margins are setose, especially distally. The propodus is 0,76 mm. long, little shorter than the carpus and just half as broad as long, presenting its greatest width just in the middle and appearing a little broader at the articulation of the dactylus than at that of the carpus; its outer surface is covered on and near both margins, of which the upper is regularly curved, the lower straight, with long ciliated hairs and a row of setae occurs also in the middle. The slender dactylus is 0,82 mm. long, a little longer than the propodus and narrow, being 0,155 mm. broad near the proximal extremity, 5-times as long as broad; it barely narrows until at one-third its length from the pointed tip, which is slightly turned outward, both margins running almost parallel until the distal third, where the lower, running obliquely to the tip, is cut into five or six slender spines, of which the first is half as long as the following. The outer side bears plumose setae and long ciliated hairs are placed on the straight upper margin.

The sternal plaque between the legs of the fourth pair is anteriorly a little broader than long, furrowed in the middle line and the lateral margins that are emarginate and concave, terminate anteriorly in a sharp tooth.

The legs of the fourth pair resemble those of the third, but are a little shorter.

The legs of the fifth pair are subcheliform and resemble those of the other species of this subgenus. The merus, measured along its arcuate upper border, proves to be 1,12 mm. long and 3-times as long as broad, presenting its greatest width in the middle; the carpus, measured in the same manner, is 1,06 mm. long and 4-times as long as thick. The somewhat curved propodus is 1,2 mm. long from the carpal articulation to the pointed tip of the immovable finger and 5-times as long as broad; the immovable finger, that is somewhat turned downward, the lower border of the propodus appearing concave, is 0,2 mm. long, carries 4 or 5 sharp teeth and ends in a larger claw; the arcuate, somewhat hairy, dactylus, 0,55 mm. long, is more than twice as long as the other finger and armed on the distal third of its cutting-edge with 5 or 6 spiniform teeth. Merus and carpus are a little setose and the carpus carries a tuft of ciliated setae on its inner surface distally; the incomplete chela is concealed by a tuft of long setae on the distal part of its outer surface and these hairs extend from the distal end of the upper border of the propodus in an oblique direction to the lower margin, whereas the inner surface is also hairy.

The abdominal appendages of the 1st pair are slender, filiform. Those of the four following are biramous, the peduncle short and thick, the two rami of very unequal size, the outer large, lanceolate, the other much smaller, oblong, without a stylamblys, both fringed with long ciliated hairs; on both rami some simple setae are distributed, as well on the margins themselves as on their surface. So is e. g. the peduncle of the pleopods of the second segment 1 mm. long and about half as broad, the outer ramus 2,25 mm. long and 4-times as long as broad, presenting its greatest breadth of 0,52 mm. a little nearer to the proximal than to the distal extremity; the inner ramus is 0,85 mm. long, little more than one-third of the other and 0,22 mm. broad in the middle, also 4-times as long as broad and rounded at the distal end.

The rather not very numerous eggs are globular, small, their diameter being 0,54—0,56 mm. broad.

8. *Upogebia* (*Calliadne*) *hexaceras* (Ortm.). Pl. VIII, Fig. 11—11*f*.

Gebia (*Gebiopsis*) *hexaceras* A. Ortmann, in: Semon, Zoolog. Forschungsreisen V. 1894, p. 23, Pl. III, fig. 1 (Jenaische Denkschriften VIII).

Upogebia (*Calliadne*) *hexaceras* G. Nobili, Mission J. Bonnier et Ch. Pérez, (Golfe Persique 1901). Crustacés Décapodes et Stomatopodes, in: Bulletin Sci. France et Belgique, Vol. XL, 1906, p. 60.

Stat. 164. August 20. Lat. 1°42'.5 S., long. 130°47'.5 E. South of Salawatti Island. 32 m. Bottom sand, small stones and shells. One egg-laden female.

The identification of this specimen with *Upog. hexaceras* (Ortm.) was confirmed by the examination of the single type-specimen, a male, of this species from Thursday Island, which upon my request was kindly sent me by Prof. Haeckel of Jena.

The female from Stat. 164 is 20 mm. long; the carapace, measured also in the middle line, 6,7 mm. The rounded front (Fig. 11, 11*a*), 0,6 mm. long and 0,75 mm. broad, is a little broader than long; at either side it bears three, slightly curved, upstanding spinules that are equidistant, the posterior, however, is a little more than twice as far distant from the spine at the antero-lateral angle of the carapace than from the middle rostral spine. The distance between the apices of the two spines at the antero-lateral angles, i. e. the width of the carapace anteriorly, measures 1,2 mm.; these spines are directed somewhat outward. The lateral margins of the gastric region that slightly diverge backward and that are fringed with setae, some of which are feathered, bear 15 or 16 sharp teeth; the anterior tooth on each margin is a little larger than the following. The gastric region is smooth in the middle line and near the denticulated, lateral margins, between these smooth parts one observes numerous sharp tubercles or teeth, a few also on the rostrum; these tubercles are a little larger anteriorly than posteriorly and extend as far backward as the teeth of the lateral margins. The spine at the antero-lateral angle of the gastric region is just as large as the spines on the lateral borders of the rostrum (Fig. 11*a*) and twice as large as the next spine or tooth of the lateral border. The denticulated part of the gastric region is pubescent, as in the other species of this genus; the rest of the gastric region and of the carapace is smooth, shining, glabrous. Cervical groove moderately deep.

No spine on the antero-lateral border of the carapace.

The abdomen is also smooth and shining, the grooves near the lateral margins of the terga, that are so obvious in *Upog. Darwinii*, are in this species quite indistinct. The convex sixth segment (Fig. 11*b*) is smooth and shining, nowhere granulated and there is no shallow depression in the middle posteriorly as occurs in *Upog. Darwinii*; its posterior margin appears, however, under the microscope very finely denticulate, the teeth acute but minute.

According to Dr. Ortmann's description the telson (Fig. 11*b*) should resemble that of *Upog. intermedia* (de Man); this statement is quite erroneous. The greatest breadth of the telson, anteriorly, is 2,9 mm. and it is 2,5 mm. long, so that it presents a subquadrate form; the telson of *Upog. intermedia* = *Upog. Darwinii* (Miers), on the contrary, is one and a half times as broad as long. The telson presents its greatest width at one-fifth of its length from the anterior border; the straight lateral margins converge slightly backwards and the posterior border is nearly straight, being only very slightly concave in the middle. As in *Upog. intermedia*, a cotype (♂) of which from the Mergui Archipelago is lying before me, one observes at either

side a longitudinal carina; both carinae are united anteriorly by a transverse crest that appears under a lens minutely granulate. Posterior to this crest, the surface of the telson, that slopes down towards the posterior margin, presents a narrow median furrow and another shallow groove runs near each lateral carina; there are a few transverse rugosities anteriorly, immediately behind the transverse crest, the rest of the telson is smooth.

When directed backward the inner uropod appears as long as the telson, the outer a trifle longer.

The yellow eggs are much less numerous than in *Upog. Darwinii*, but they are considerably larger, being 0,9—1 mm. broad.

The internal antennae (Fig. 11*c*), 4 mm. long, almost two-thirds the length of the carapace, project with their flagella and the last joint of their peduncle beyond the rostrum; the first joint of the peduncle, 0,8 mm. long, is enlarged as in other species, the second, 0,24 mm. long and 0,26 mm. broad, is the shortest of all, the third joint, finally, is 0,64 mm. long and 0,22 mm. broad, 3-times as long as broad; the three joints are unarmed, but setose, the setae partly feathered, longest on the second and third joints, some setae being 1 mm. long. The thicker flagellum, composed of 22 segments, is 2,2 mm. long, just one-third the length of the carapace; the first segment, 0,24 mm. long and 0,16 mm. thick, is almost as long as the three following combined, that measure together 0,27 mm. These segments, like also the following, are all broader or thicker than long. So e. g. is the second segment 0,1 mm. long, 0,15 mm. broad, the fifth 0,08 mm. long, 0,135 mm. broad, the twelfth 0,1 mm. long, 0,14 mm. broad; the nineteenth is just as thick as long, viz., 0,1 mm., the two following are slightly longer than thick, the terminal segment, finally, is conical, 0,08 mm. long. The other much thinner and barely longer flagellum, measuring 2,4 mm., consists of 15 segments, that are 3- or 4-times as long as thick, each with a few, long hairs near their distal end; in the middle of its length this flagellum appears barely half as thick as the other.

The external antennae, measuring about 10,5 mm., are just one and a half times as long as the carapace. The peduncle resembles that of the other species of this genus; the joints are unarmed, there is, however, at the distal end of the upper border of the second joint a small scaphocerite, that ends anteriorly in a minute, acute tooth, but even this tooth does not outreach the distal extremity of the outer surface of the second joint, which is 0,8 mm. long; the penultimate joint measures 1 mm., the terminal joint 0,6 mm. and all are furnished with long, feathered hairs; the flagellum measures 7 mm., being about as long as the carapace. The antennular peduncle is much shorter than that of the outer antennae, reaching not yet as far forward as the penultimate joint of the antennal peduncle.

The legs of the first pair resemble those of *Upog.* (*Calliadne*) *intermedia* and are equal. The merus is 3,65 mm. long and 1,4 mm. broad in the middle of its outer side; there is a row of 13 small acute teeth along the proximal two-thirds of the inner lower border, which is fringed with long hairs; the arcuate, upper border is unarmed. The carpus bears a small spine at the distal end of the inner border of its upper surface and behind this spine one observes along the whole extent of the inner border 4 or 5 smaller teeth; between the distal spine and the articulation of the chela there are still three very small teeth, exactly as in Ortmann's type (see below). There is also a very small tooth at the distal end

of the lower surface. The chela is 5 mm. long, the palm 3,25 mm., the fingers half as long as the palm; the latter is 1,8 mm. high and almost twice as long as high. The fingers (Fig. 11*d*, 11*e*) are equally long, the movable with its pointed tip curved downward, its prehensile edge unarmed, excepting a single tooth near the base; the slightly curved, lower finger that regularly tapers to the acuminate tip, is denticulate, presenting along its whole length 13 or 14 small, sharp teeth, that gradually decrease in size distally. The lower border of the palm is finely denticulate, presenting 14 or 15 very small teeth.

The following legs resemble those of *Upog.* (*Calliadne*) *intermedia*. The propodus of the second legs (Fig. 11*f*) is 2,2 mm. long, measured along the straight posterior margin; its greatest breadth, near the carpal articulation, is 0,86 mm., while at the distal extremity it is 0,36 mm. broad; dactylus 1 mm. long.

The nearly straight carpus of the fifth pair is 1,8 mm. long, from articulation to articulation. These legs are subcheliform. The propodus proves to be 2,3 mm. long until the extremity of the immovable finger, and it is 0,5 mm. broad; the short immovable finger is 0,36 mm. long, the strongly curved tapering dactylus 0,8 mm.

The following remarks about the single type specimen of *Upog.* (*Calliadne*) *hexaceras* (Ortm.), still preserved in the Museum at Jena, will, I suppose, be welcome. It is a male, long 24 mm.; the carapace, rostrum included, is 8,2 mm. long and the distance between the tip of the rostrum and the cervical groove, measured in the middle line, is 5,6 mm. long. The somewhat triangular rostrum is 1,24 mm. long and at its base 1,12 mm. broad, slightly longer than broad; its extremity is truncate, whereas the lateral borders are a little arcuate, the rostrum thus narrowing to the tip. At either side the rostrum carries three spines, though in this specimen the second on the left side is wanting; the anterior pair stands on the truncate tip and the apices of the two teeth of this pair are 0,28 mm. distant from one another; the second tooth stands also on the lateral border at a distance of 0,32 mm. from the first or anterior; the two teeth of the third pair are 0,64 mm. distant from one another, and they are 0,6 mm. distant from the tip of the rostrum. The teeth of the third pair are placed a little inside of the lateral border, not on the border itself as are the two anterior pairs. The rostrum has thus a somewhat other form than in the female collected by the "Siboga", but this discrepancy is no doubt sexual, local or individual.

The antero-lateral border of the carapace bears no spine.

The telson is 3,2 mm. long and 3,4 mm. broad.

Second joint of the antennal peduncle 1 mm. long, penultimate 1,4 mm., terminal joint 0,7 mm., scaphocerite as in the "Siboga" specimen.

Measured in a lateral view the third joint of the antennular peduncle proves to be 0,9 mm. long, 0,28 mm. broad in the middle, 3-times as long as broad; the thicker flagellum is 2,9 mm. long and composed of 26 segments, the other, which is much thinner, 3 mm. long and composed of 15 segments. The merus of the first pair of legs is 4,25 mm. long, 2,1 mm. broad in the middle, the carpus presents the same spines as in the female from Stat. 164 and fully agrees with it. The chela is 6,2 mm. long, the palm 4,2 mm. and the fingers, of which the immovable is laterally compressed, are 2 mm. long, just half as long as the palm.

Upog. (*Calliadne*) *hexaceras* (Ortm.) differs from *Upog.* (*Calliadne*) *Darwinii* (Miers) = *intermedia* de Man by its smaller size, by less numerous, much larger eggs, by the different form of the rostrum, by the subquadrate telson, by the armature of the carpus and the denticulation of the lower border of the palm of the anterior legs. It differs from *Upog.* (*Calliadne*) *ancylodactyla* de Man at first sight by the less curvate and longer fingers of the anterior legs, by the form of the antennular flagella and by several other characters.

Geographical distribution: Thursday Island (Ortmann); Persian Gulf (Nobili).

9. *Upogebia* (*Calliadne*) *Darwinii* (Miers). Pl. VIII, Fig. 12—12*b*; Pl. IX, Fig. 12*c*—12*f*.

Gebiopsis Darwinii E. J. Miers, Report Zool. Coll. made in the Indo-Pacific Ocean during the voyage of H. M. S. "Alert" 1881—82, London 1884, p. 281, Pl. XXXII, fig. A.

Gebiopsis Darwinii J. R. Henderson, A Contribution to Indian Carcinology. London 1893, p. 432 (Trans. Linn. Soc. London, Zool. Ser. 2, Vol. V).

Upogebia (*Calliadne*) *Darwini* G. Nobili, Faune Carcinologique de la Mer Rouge. Décapodes et Stomatopodes, in: Annales des Sc. Nat. Paris, 9e Série. Zool. T. IV, 1906, p. 97.

? *Upogebia* (*Calliadne*) *darwini* L. A. Borradaile, The Percy Sladen Trust Expedition to the Indian Ocean in 1905. Vol. II. N° X. — Penaeidea, Stenopidea, and Reptantia from the Western Indian Ocean. London 1910, p. 262. (Transact. Linnean Soc. London. Ser. 2. Zool. Vol. XIII).

Gebiopsis intermedia J. G. de Man, Crustacea of the Mergui Archipelago, London 1888, p. 256, Pl. XVI, fig. 2 (The Journal of the Linnean Soc. Zool. London. Vol. XXII).

Gebia (*Gebiopsis*) *intermedia* A. Ortmann, in: Semon, Zoolog. Forschungsreisen V, 1894, p. 23 (Jenaische Denkschriften VIII).

Gebiopsis intermedia L. Zehntner, Crustacés de l'Archipel Malais, Genève 1894, p. 194 (Revue Suisse de Zoologie et Annales du Musée d'Histoire Nat. de Genève, T. II, 1894).

Gebiopsis intermedia W. F. Lanchester, On the Crustacea coll. during the "Skeat Expedition" to the Malay Peninsula, London 1901, p. 555 (in: Proc. Zool. Soc. London 1901).

Upogebia intermedia J. Pearson, Report on the Pearl Oyster Fisheries of the Gulf of Manaar. Supplem. Report XXIV. On the Macrura. 1905, p. 91.

Stat. 181. 5/11 Sept. Ambon. Reef. One full-grown, egg-laden female, 38 mm. long from tip of rostrum to end of telson.

Already in 1893 Mr. J. R. Henderson (l. c.) has proved *Gebiopsis intermedia* de Man 1888 from the Mergui Archipelago to be identical with *Gebiopsis Darwinii* Miers from Port Darwin, North Australia, having compared a single type-specimen of the former in the British Museum with the types of Miers's species. One of the two male type-specimens from Elphinstone Island is preserved in my private collection and is 35 mm. long. The frontal region of the carapace presents a different form in the *intermedia*-type and in the female from Ambon than in the figure a on Pl. XXXII of the original description and therefore I have drawn a figure of the front of the *intermedia*-type from Mergui (Fig. 12). The rostrum is triangular, with obtuse tip, one and a half as broad at its base as it is long, projects a little, in the male from Mergui nearly $^1/_3$ mm., beyond the eyes and bears on its borders four equidistant teeth, two on each side, one of which, viz., the posterior on the right side, is spiniform, the three other teeth are probably broken off. The rostrum is separated by narrow interspaces from the anterior teeth of the lateral ridges of the gastric region; the teeth of the lateral ridges are sharp, the anterior tooth is the largest, the following decrease gradually in size; between the two, slightly divergent ridges the gastric region bears many other small

teeth, near which short hairs are implanted, but the posterior third part of the gastric region is smooth and glabrous.

No spine on the antero-lateral border of the carapace.

The sixth segment of the abdomen and the telson of the *intermedia*-type are also figured, like also the left cheliped and the left antennule. The sixth somite (Fig. 12*a*) presents a shallow, triangular depression in the middle of the posterior half of the tergum, which appears somewhat granular between this depression and the well-defined lateral grooves; the anterior half of the tergum is smooth, presenting only a few punctations. As has been shown by HENDERSON, MIERS's figures of *Geb. Darwinii* are rather incorrect, this may also be the case with the front.

The antennular peduncle is little shorter than that of the outer antennae, reaching to the middle of the last joint of the latter. The antennule of the type of *intermedia* from Mergui (Fig. 12*c*, 12*d*) presents the following characters. The second joint of the peduncle is 0,5 mm. long and 0,52 mm. broad; the third joint is 1,6 mm. long, shows its greatest thickness of 0,38 mm. near the base, is 0,325 mm. broad in the middle and 0,37 mm. at the distal end, so that the terminal joint may be described as 5-times as long as thick. The thicker flagellum, 3,2 mm. long, just twice as long as the third joint of the peduncle, is composed of 29 segments; the first segment, 0,27 mm. long and 0,23 mm. thick, is as long as the two following taken together, the second being 0,13 mm. long, 0,2 mm. thick, the third 0,14 mm. long and also 0,2 mm. thick. The following segments are all thicker or broader than long, so e. g. the tenth segment is 0,11 mm. long and 0,18 mm. broad; near the tip the segments become a little longer in proportion to their breadth, so the twenty-fifth is 0,09 mm. long and 0,106 mm. broad, the twenty-seventh 0,09 mm. long and just as broad, the penultimate 0,1 mm. long, 0,08 mm. thick, the last segment, finally, is conical, 0,08 mm. long and 0,055 mm. thick at its base. The other flagellum, 3,8 mm. long, one-fifth longer than the outer, is composed of 22 segments, that are longer than thick: so e. g. the tenth segment is 0,22 mm. long and 0,1 mm. thick, so that the thicker flagellum appears a little more than once and a half as thick as the inner; the last segment is conical, the shortest of all, 0,08 mm. long and 0,035 mm. thick at its base.

The antennule (Fig. 12*e*, 12*f*) of the female of *Upog. Darwinii* from Ambon shows the following measurements. The second joint of the peduncle is 0,5 mm. long and 0,47 mm. thick; the slender third joint is 1,6 mm. long, 0,33 mm. thick near its base, 0,255 mm. in the middle and 0,275 mm. at the distal end; this joint, nearly 6-times as long as thick, appears a little more slender than in the Mergui male, but much slenderer than in *Upog.* (*Calliadne*) *hexaceras* Ortm. and *Upog.* (*Calliadne*) *ancylodactyla*. The thicker flagellum is 2,94 mm. long and consists of 24 or 25 segments, that much resemble those of the Mergui male, described above though not exactly agreeing with it. The first segment is 0,22 mm. long, the two following together 0,24 mm.; the first is 0,17 mm. thick, the second 0,14 mm. long, 0,16 mm. thick, the third 0,1 mm. long and one and a half times as broad; the fourth 0,17 mm. long, 0,155 mm. thick, like the fifth, being slightly longer than thick; all the following are distinctly thicker or broader than long, so e. g. the tenth segment is 0,12 mm. long, 0,16 mm. thick. The last segments (Fig. 12*f*) become a little longer in proportion to their breadth like in the Mergui male, so the twenty-second is 0,09 mm. long and just as broad, the twenty-third 0,1 mm. long

and 0,07 mm. thick, the last conical. The segments of this flagellum are thus comparatively a little less broad than in the male from the Mergui Archipelago. The other flagellum is 3,66 mm. long and consists of 21 segments that are all longer than thick, except the last one, the shortest of all, which is 0,06 mm. long and conical; so e. g. the tenth segment, about in the middle of the flagellum, is 0,19 mm. long and 0,105 mm. thick, nearly twice as long as thick. The upper flagellum is thus once and a half as thick as the lower, just as in the male from Mergui.

In the male from the Mergui Archipelago the second joint of the antennal peduncle bears a small, pointed, movable scaphocerite at the distal end of its upper border, which in my original description of 1888 is already mentioned as "a minute spinule" (l. c. p. 258); it occurs also in the female from Ambon, but is here somewhat less conspicuous.

As regards the front, the rostrum and the abdomen the female from Ambon agrees with the type of *Upog. intermedia*, described above, but I will remark that in younger specimens the telson appears comparatively less enlarged. In the full-grown female from Ambon the telson is 5,7 mm. broad and 4 mm. long, in the type of *Upog. intermedia* from Mergui, that has nearly the same size, it is 6,2 mm. broad, 4,2 mm. long, but in a younger female from the Red Sea, received from the Museum at Turin and 31 mm. long, the telson is 4,5 mm. broad, but 3,7 mm. long. In the female from Ambon the legs are a little more slender than those of the Mergui type.

The Reverend Stebbing, dealing with the definition of this genus, in: South African Crustacea, Cape Town, 1900, p. 43, remarks that in my figures of *Geb. intermedia* (l. c. Pl. 16, figs. 6 and 7) the fixed finger appears much shorter than the other. In these figures, however, the immovable finger is only apparently shorter, it looks so in consequence of the distortion of the hand and of the position, in which it has been figured: both fingers are really of equal length as is shown by Fig. 12*b*, in which the chela is looked at in a lateral view.

The merus of the left leg of 1st pair (Fig. 12*b*) is in the Mergui type 6 mm. long and 2,5 mm. broad, measured on its outer side, for the female from Ambon these numbers are 6,75 mm. and 2,2 mm.; in both specimens the chela is 6,4 mm. long, in the Mergui type 2,65 mm. high or broad, in the female from Ambon 2,25 mm. For the rest these legs agree with one another in both specimens, so e. g. there is a row of minute spinules on the inner lower border of the meri of the first legs and the carpus is armed with a strong spine at the distal end of the upper border and with another at that of the lower. Like those of 1st pair, so also appear the other legs somewhat more slender in the female from Ambon, than in the Mergui type, a male, of *Geb. intermedia*. It is impossible to decide whether the described slight discrepancies between both specimens are of a sexual, local or individual character, because they are not mentioned in the original description of *Geb. intermedia*; the examination of a larger number of specimens, males and females, from various localities will therefore be necessary. I am, however, inclined to think that they are of a sexual character.

Geographical distribution: Port Darwin, North Australia (Miers); Amboina (Ortmann, Zehntner, de Man); Singapore (Miers); Pulu Bidan, Penang (Lanchester); Elphinstone Island, Mergui Archipelago (de Man); Rameswaram, Tuticorin, Cheval Par (Henderson); South of Adam's Bridge and Muttuvaratu Paar (Pearson); Saya de Malha Bank (Borradaile); Aden, Perim, Obock (Nobili).

10. *Upogebia* (*Calliadne*) *ancylodactyla* de Man Pl. IX, Fig. 13—13*h*, Pl. X, Fig. 13*i*—13*j*.

Upogebia (*Gebiopsis*) *ancylodactyla* J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging (2) Dl. IX, 1905, p. 599.

Stat. 60. April 27/28. Haingsisi, Samau Island, Timor. Shore. One male and one, somewhat larger, ova-bearing female.

Stat. 323. Febr. 24/25, 1900. Sangkapoera-roads, Bawean-Island. 12 m. Bottom mud. One specimen.

The ova-bearing female from Stat. 60 is 18,5 mm., the male 17 mm. long. The carapace of the female, that will be described, is 5 mm. long, measured in the middle line. The obtuse rostrum (Fig. 13) is short, 0,6 mm. long and broad, its length being about one-ninth that of the carapace; it carries anteriorly four subacute, upstanding teeth, two on either side that are somewhat curved backward; the lateral ones are 0,22—0,24 mm. high, all are equidistant. Near the base of the rostrum I observe four other, slightly shorter spinules, arranged in a transverse line. At each antero-lateral angle of the carapace stands a slightly curved, subacute tooth; the distance between the tips of these two teeth, which are 0,15 mm. high, i. e. the width of the carapace anteriorly, measures 0,84 mm., one-sixth the length of the latter. The lateral margins of the gastric region, that slightly diverge backward as in other species and that are 1,8 mm. long, are armed behind the tooth at the antero-lateral angle, with eight or nine similar, subacute teeth, that gradually decrease in size backward. As far as extend the lateral margins, the gastric region is covered with similar, subacute tubercles, except just near the lateral margins; these tubercles also are somewhat larger anteriorly and become gradually smaller posteriorly. As usual the gastric region is pubescent between the tubercles, the feathered hairs stand close together on the rostrum and on the anterior half of the gastric region. The median portion of the cervical groove is deep, the lateral parts are shallow.

No spine on the antero-lateral border of the carapace.

The sublateral grooves on the abdominal terga that are smooth, are indistinct. The sixth segment (Fig. 13*a*) resembles that of *Upog.* (*Calliadne*) *intermedia*. The telson is subquadrate, being 2 mm. long and 2,24 mm. broad; the lateral margins run nearly parallel, like also the anterior and the posterior which is straight. The lateral carinae carry four or five, small, subacute tubercles along their whole length; the transverse crest that unites them, is situated at one-fourth the length of the telson from its anterior border; in front of the transverse crest one observes at either side a triangular groove, nearly as in *Upog. intermedia* and just behind the crest the telson appears a little uneven. As well the lateral furrows as a median, longitudinal furrow are rather indistinct.

The yellow globular eggs are, as in *Upog.* (*Calliadne*) *hexaceras*, few in number, but large, their diameter being 0,9 mm. broad.

Eyepeduncles a little shorter than the rostrum, cornea black, distinctly faceted. The inner antennae (Fig. 13*b*) are 3,66 mm. long, about three-fourths the length of the carapace. The first enlarged joint of the peduncle, that is 1,58 mm. long, is 0,7 mm. long, the second, the shortest of all, 0,22 mm. long, 0,24 mm. broad, the third joint is 0,66 mm. long, 0,14 mm. thick at its base and 0,18 mm. at the distal end, this joint thickening somewhat towards its

distal extremity. The thicker, upper flagellum, measuring 1,56 mm., is just as long as the peduncle; it consists of 13 segments, the first of which is just as long as the second and the third combined; in the middle of the flagellum the segments are a little longer than broad and the last segment is very short, conical. The other flagellum, also composed of 13 segments and measuring 2,1 mm., is somewhat longer than the upper. The joints of the peduncle are unarmed, but carry some hairs that are partly feathered; the segments of the inner flagellum are furnished with rather long hairs near their distal end. The inner antennae project with the third joint of their peduncle beyond the rostrum and this joint extends with one-fourth of its length beyond the penultimate joint of the outer antennae. In this species the third joint of the peduncle has a less stout shape than in *Upog.* (*Calliadne*) *hexaceras* and in *Upog. hexaceras* the segments of the upper flagellum are considerably broader in proportion to their length than in *Upog.* (*Calliadne*) *ancylodactyla*. In *Upog. Darwinii* Miers (and in *Upog. intermedia* from the Mergui Archipelago) the segments of the upper flagellum are also broader than long.

The outer antennae, measuring about 7,5 mm., are one and a half times as long as the carapace and twice as long as the inner. The joints of their peduncle, that is 2,5 mm. long, are unarmed and there is no trace of a scaphocerite at the distal end of the upper border of the 2nd joint; the 2nd and the terminal joint are 0,6 mm. long, the penultimate 0,8 mm. and they are furnished with long feathered hairs like in the other related species. The flagellum is 5 mm. long.

The anterior legs much resemble those of *Upog.* (*Calliadne*) *Darwinii* (Miers) and are equal. The meri that are 2,9 mm. long and 1 mm. broad in the middle of their outer surface, are armed (Fig. 13*d*) with 7 or 8 small, sharp teeth on their inner lower margin, which is fringed with long hairs as in the other species; the upper border is unarmed. The carpus bears a small spinule at the distal end of the inner border of the upper surface and a very small, acute tooth at that of the lower. The chelae (Fig. 13*c*) are 3,2 mm. long, the fingers, measured horizontally, 0,8 mm.; the palm is 2,4 mm. long and half as high. The fingers measure thus one-fourth the length of the whole chela, which is nearly three times as long as high; the dactylus (Fig. 13*e*) is strongly curved, more than in *Upog. Darwinii* and considerably more than in *Upog. hexaceras*; the immobile finger, a little shorter than the dactylus, is also much more curved than in those species. The cutting-edges of both fingers are entire, except 2 or 3 minute teeth at the base of the fixed finger, and the palm is unarmed.

The other legs agree with those of the Mergui type of *Upog. intermedia* (vide p. 86). The propodus of the 2nd legs (Fig. 13*f*) is 1,8 mm. long, measured along its straight posterior border; its greatest breadth near the carpal articulation is 0,78 mm., its breadth at the distal end 0,36 mm.; dactylus 0,7 mm. long.

The legs of the 5th pair are subcheliform. The carpus is 1,56 mm. long from articulation to articulation, the slightly curved propodus is 1,8 mm. long, until the extremity of the immovable finger and 1,5 mm. without it; the propodus is 0,4 mm. broad in the middle and the strongly curved dactylus is about 0,7 mm. long. In the male the 5th pair is also subcheliform and agrees with that of the female.

The specimen from Stat. 323 shows some differences from the preceding description, which in my opinion are owing to it not yet being full-grown, though this specimen, probably a male, is just as long, 17 mm., as the typical male from Stat. 60. In *Upog. ancylodactyla* the rostrum bears anteriorly four equidistant teeth, two on each border, of which the subacute tips are curved backward; in the specimen from Stat. 323 the posterior spine on the right border (Fig. 13*g*) is substituted by two, so that one observes here three teeth, instead of two; on the left side are only two teeth. This is, however, only an individual variation proving that the number of rostral teeth is somewhat variable.

A more essential difference is presented by the antennulae (Fig. 13*i*). The peduncle agrees with that of the typical female from Stat. 60, the 3rd joint, 0,72 mm. long, appears, in a lateral view, at the base 0,14 mm. broad, at the distal end 0,16 mm., nearly 5-times as long as broad, but this joint is 4-times as long as the 2nd, which is 0,18 mm. long and 0,22 mm. broad. The thicker, upper flagellum, 1,16 mm. long, a little shorter than the peduncle, is composed of 14 segments, of which the 1st or proximal is slightly shorter than the 2nd; in the typical female from Stat. 60 this flagellum consists of 13 segments, of which the 1st (Fig. 13*b*) is as long as the two following together; the upper flagellum, however, appears in the specimen from Stat. 323 much broader in proportion to its length, the breadth in the middle being one-ninth, in the typical female, however, one-fifteenth of the length, so that it presents in the latter a more slender form. Whereas in the typical female the lower flagellum is much longer than the upper, reaching with its three terminal segments beyond it, in the specimen from Stat. 323 it barely outreaches it, the two flagella being of subequal length; it is composed in the typical female of 13, in the specimen from Stat. 323 of 9 segments.

The telson appears in the specimen from Stat. 323 (Fig. 13*k*) a little broader in proportion to its length, being 1,6 mm. long and 2,08 mm. broad, nearly one-third broader than long, in the typical female, however, only one-eighth; the lateral carinae are, moreover, smooth, not presenting the subacute tubercles found in the type specimens.

The chelipeds agree with the type, but I did not succeed in observing the small sharp teeth on the lower border of the merus and, as regards the fingers, I would remark that the prehensile border (Fig. 13*j*) of the immobile finger bears five obtuse teeth on the three proximal fourth parts of its length and that the dactylus presents a small obtuse tooth in the middle of its prehensile border. For the rest this specimen resembles the types.

Some remarks may be added here on a closely related species of *Upogebia*, also belonging to the subgenus *Calliadne*, which I have described in 1888 as a variety *amboinensis* of *Gebiopsis intermedia* de Man (J. G. de Man, in: Archiv f. Naturg. 53. Jahrg. p. 462 and in: Abhandl. d. Senckenb. Naturf. Gesellsch. Bd. XXV, 1902, p. 759). Four of the seven specimens from Amboina, described in 1888, are again lying before me and a renewed examination proved that this form cannot be considered as a variety neither of *Upog. Darwinii* nor of *Upog. intermedia* and that it is most closely related to *Upog.* (*Calliadne*) *ancylodactyla*: it presents some differences, however, so that it may provisionally be known as a variety *amboinensis* of *Upog. ancylodactyla*.

In the first place are the eggs a little smaller than those of *Upog. ancylodactyla*.

One of the four slate-coloured specimens, received from the Göttingen Museum, is a female, long 19 mm., with eggs; this fact proves already that these specimens are adult, the largest is 29 mm. long. The diameter of the eggs is 0,6 mm. broad, two-thirds that of the eggs of *Upog. ancylodactyla*.

The telson (Pl. X, Fig. 14) has nearly the same form as in *Upog. ancylodactyla*; in a female, without eggs and 26 mm. long, the telson is 3 mm. long and 4 mm. broad, but it is distinctly furrowed in the middle line and, immediately behind the anterior transverse crest, one observes on each side of the median furrow another transverse crest, which at its outer extremity is curved backwards, though only for a short distance, parallel with the granulated lateral carinae; posterior to and parallel with the anterior transverse carina runs thus another, that is interrupted in the middle by the median furrow; this second carina is fully wanting in the typical *Upog. ancylodactyla*. In this variety the basal joint of the caudal swimmerets carries an acute spine at its postero-external angle, in the typical specimens of *Upog. ancylodactyla* this spine is rudimentary. The posterior border of the inner uropod appears finely denticulate in the female of *Upog. ancylodactyla* as also in the female, long 19 mm., of the variety *amboinensis*, but in the other specimens of the latter it appears entire.

The inner antennae (Pl. X, Fig. 14*a*) agree fairly well with those of the female of *Upog. ancylodactyla*, described above. In the egg-bearing female, long 19 mm., from Amboina they show the following measurements. The 2nd joint of the peduncle is 0,28 mm. long and 0,26 mm. thick; the 3rd joint, that has the same form as in the female from Stat. 60, is 0,7 mm. long, 0,16 mm. thick at the base and 0,22 mm. at the distal end, appearing here but little thicker. The outer flagellum is 2,08 mm. long and composed of 15 segments, the first of which is 0,26 mm. long; the two following are together 0,3 mm. long, nearly as long as the first. The 3rd segment is slightly shorter than the 2nd, in the female of *Upog. ancylodactyla* from Stat. 60 slightly longer than it; the other segments agree in both specimens, except that in the female of the variety they appear a little less thick in proportion to their length. The other flagellum is 2,6 mm. long, in proportion to the outer nearly as long as in the typical female of *Upog. ancylodactyla*; this flagellum is composed of 16 segments, that agree with those of the typical species. The same conformity exists as regards the outer antennae. The penultimate joint of the peduncle is 1 mm. long, the terminal joint just half as long, appearing a little shorter than in the type; flagellum 6,08 mm. long. In my work of 1902 on the Decapod Crustacea, collected by Prof. Kükenthal (l. c.), I have already expatiated on the characteristic colouration of this variety.

The typical female from Stat. 60 presents a trace of this slate colour of the body and the fingers of the 1st pair appear also somewhat reddish. The examination of a larger number of specimens will be necessary to decide whether these specimens from Amboina should be regarded as a variety *amboinensis* of *Upog.* (*Calliadne*) *ancylodactyla* or as a distinct species. *Upog. ancylodactyla* de Man differs from *Upog. Darwinii* Miers (*intermedia* de Man) by its smaller size, by the less numerous, much larger eggs, by the subquadrate shape of the telson, by the more strongly curved fingers of the anterior legs etc.

Callianassa Leach.

The genus *Callianassa* was instituted in 1814 by W. E. Leach to receive a Crustacean which Colonel Montagu described in 1805 (and published in 1808) under the name *Cancer Astacus subterraneus*; this species was found two feet beneath the surface in a sandbank in the estuary of Kingsbridge or Salcombe in South Devon. A second species was discovered in the sand of the bay shore of the river St. John in East Florida and described by Thomas Say in 1818 under the name *Call. major*, a third ten years later near Nice in the Mediterranean and described by Otto as *Call. laticauda*, while in the "Histoire Naturelle des Crustacés" a fourth, *Call. unci-nata* from the coast of Chile was made known by H. Milne-Edwards. In his famous work on the Crustacea of the Exploring Expedition a large species, four and a half inches long, from Puget's Sound was described and figured by J. D. Dana in 1852 and this author founded moreover the new genus *Trypaea* for a species living on the shores of New South Wales, that should differ from *Callianassa* by the subpediform inner antennae, of which the flagella are shorter than the terminal joint of the peduncle. Other species were made known in the following years, in 1866 Stimpson established the genus *Callichirus* for Say's *Callianassa major*, in 1870 A. Milne-Edwards published his interesting "Révision du genre *Callianassa*", in which seven recent and three fossil species were described and in 1888 the important "Report on the Decapoda Macrura collected by the "Challenger" was issued, that contributed, however, rather little to our knowledge of this genus. Only one new species, from the West-Indies, was described, of which only a solitary specimen of the larger cheliped was all that was taken. Two new genera, *Cheramus* and *Scallasis*, were created by the author; concerning the former the Reverend Stebbing remarks in "A History of recent Crustacea, p. 184" the following: "In *Cheramus* they (the external maxillipeds) are distinguished as pediform, but it seems rash to establish a new genus on the very character which some authors ascribe to the old one, especially as *Callianassa* is not unrepresented in England, France, and the Mediterranean, and specimens might have been examined to clear up the disputed point". In *Call. subterranea* (Montagu) the external maxillipeds are, however, pediform, but Spence Bate has certainly not examined this species but specimens of *Call. laticauda* Otto, which species is described in the "Histoire Naturelle des Crustacés" and in the "Règne Animal of Cuvier" under the name *Call. subterranea*.

In the "Annals and Magazine of Nat. History" of November 1903 a useful and practical paper "On the Classification of the Thalassinidea" was published by L. A. Borradaile, in which the author proposed to subdivide the genus *Callianassa* into five subgenera: *Calliactites*, *Cheramus*, *Trypaea*, *Callichirus* and *Scallasis*, reducing the four last mentioned genera to the rank of subgenera and adding a fifth, *Calliactites*. These five subgenera are also accepted in this work, though it ought to be remarked that, excepting perhaps *Calliactites*, the definitions of these subgenera are not very sharp.

The genus *Callianassa* contains at present 76 species and 3 varieties, but 46, almost two-thirds of the whole number, have not been found again since their first description! Many of these 46 species are still imperfectly known, in spite of my *Callianassa*-paper [1]), which was

1) J. G. de Man, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. With 148 illustrations on 12 plates. 's Gravenhage 1928 (Capita Zoologica, Deel II, Aflev. 6).

published in May 1928. A Monograph of the genus *Callianassa* is much desirable, but it will be impossible to write such a work, as long as our knowledge of many species will be so incomplete. The fact that such a large number of species are no more recorded in literature since their first description, because they were not recollected since that time, is evidently owing to the recluse mode of life of these fossorial animals, that live in subterranean passages. This fact also explains the great rarity of species of this genus in the Musea, because the 46 species, mentioned above, exist, of course, only in that Museum, in which the only type is preserved. This fact, finally, renders it moreover very probable that many species are even not yet discovered at all and are still unknown to science.

Until 1900 only seven species of this genus were known as living in the East-Indian Archipelago, the Siboga-Expedition, however, has collected no less than 14 species, that proved all to be new to science, excepting only two.

The genus *Callianassa* is represented almost in all parts of the world. The coasts of Europe are inhabited by six species. Of these *Call.* (*Cheramus*) *subterranea* (Montagu), the first described of all, inhabits the south coast of Devon, but has a few years ago been captured also off Bengasi, north coast of Africa, *Call.* (*Cheramus*) *minor* Gourret, a species of small size, only 13 mm. long, is known from Marseilles, the southern Adriatic and the Aegean Sea; *Call.* (*Trypaea*) *truncata* Giard and Bonnier and *Call.* (*Trypaea*) *italica* Parisi were found in the Gulf of Naples, *Call.* (*Callichirus*) *laticauda* Otto and *Call.* (*Callichirus*) *Pestae* de Man are both known from the Mediterranean and the west coast of France, the latter moreover occurring in the whole Adriatic.

Seven species are known from the southern part of the Red Sea, six of which Nobili has described in the beginning of this century, while the seventh, *Call.* (*Callichirus*) *mucronata* Strahl has also been observed on Male Atoll, Maldives and in various parts of the Indian Archipelago. The east coast of Africa and the Indian Ocean are inhabited by fourteen species, three of which, found in the Bay of Bengal and in the Andaman Sea, belong to the subgenus *Calliactites*, the others to the subgenera *Trypaea* and *Callichirus*. *Call.* (*Callichirus*) *maxima* A. M.-Edw. was first described from a single chela of gigantic dimensions, obtained in a subfossil condition in Siam, many miles from the sea, this chela was 60 mm. long; afterwards this species has been observed near Madras and in the Chilka Lake in a living state. *Call.* (*Callichirus*) *Grandidieri* Cout. and *Call.* (*Callichirus*) *madagassa* Lenz and Richters occur, the former in the river Mahanara, north-east coast of Madagascar, at several hundreds of meters distant from the mouth, where the water becomes brackish only at spring-tide, the other on the island of Nossi-Bé, near Madagascar, a species remarkable by the singular shape of the smaller cheliped. The Maldive Archipelago is inhabited, besides by *Call.* (*Trypaea*) *maldivensis* Borr. and *Call.* (*Callichirus*) *novae-britanniae* Borr., moreover by a variety *Borradailei* de Man of the west-indian *Call.* (*Callichirus*) *longiventris* A. M.-Edw., which perhaps should be considered as a distinct species, *Call. novae-britanniae*, however, was first recorded from New Britain. *Call.* (*Calliactites*) *rotundicaudata* Stebb., observed at Cheval Paar, Ceylon, was first described from South Africa.

The Indian Archipelago is inhabited by no less than twenty-three species, that are the following:

Call. (*Calliactites*) *secura* Lanch.
Call. (*Calliactites*) sp.
Call. (*Calliactites*) *modesta* de Man
Call. (*Cheramus*) *Sibogae* de Man
Call. (*Cheramus*) *propinqua* de Man
Call. (*Cheramus*) *joculatrix* de Man
Call. (*Cheramus*) *orientalis* (Bate)
Call. (*Cheramus*) *lobetobensis* de Man
Call. (*Cheramus*) *intermedia* de Man
Call. (*Cheramus*) *praedatrix* de Man
Call. (*Cheramus*) *pugnatrix* de Man
Call. (*Cheramus*) *pygmaea* n. sp.
Call. (*Cheramus*) *moluccensis* de Man
Call. (*Cheramus*) *indica* de Man.
Call. (*Trypaea*) *amboinensis* de Man
Call. (*Callichirus*) *placida* de Man
Call. (*Callichirus*) *assimilis* n. sp.
Call. (*Callichirus*) *armata* A. M.-Edw.
Call. (*Callichirus*) *vigilax* de Man
Call. (*Callichirus*) *tridentata* von Martens
Call. (*Callichirus*) *mucronata* Strahl.
Call. (*Callichirus*) *audax* de Man
Call. (*Scallasis*) *amboinae* (Bate).

All these species seem to be confined to these islands, having not yet been collected outside of the Archipelago, excepting *Call. armata* A. M.-Edw., which was first recorded from the Fiji Islands, *Call. mucronata* Strahl, which is also known from the Maldive Archipelago and the Red Sea, and, finally, *Call. tridentata* von Martens, that was first recorded from Java but that should occur also on the shores of Ceylon (E. J. Miers, in: Proc. Zool. Soc. London, 1884, p. 13). All these species are mostly of a small size, excepting *Call. indica* from the south coast of Kangeang and *Call. vigilax* from Amboina, which attain respectively a length of 90 mm. and 85 mm.; the former was captured by the Siboga-Expedition, the latter by Mr. Ludeking in 1863, but it is evidently their recluse mode of life beneath the surface, owing to which species of such a large size did remain so long unknown. Of *Call. joculatrix* no less than 38 specimens were collected and of *Call. modesta* 12, but of all the others unfortunately only one or two.

Four species, all belonging to the subgenus *Trypaea*, are known from Japan, but one of them, the variety *japonica* Bouv. of *Call. californiensis* Dana, may perhaps once prove to be the full-grown stage of *Call. japonica*.

Call. australiensis, the type species of *Trypaea*, which was described by Dana from a specimen taken at Illawarra, N. S. W., is exceedingly abundant, burrowing in muddy flats at many parts of the coast of Victoria and of New South Wales; on the coast of Victoria still another closely allied species occurs, *Call. ceramica* Fulton and Grant, at Kingston, South Australia, finally, a species of the subgenus *Callichirus* was taken, *Call. aequimana*, in which the anterior legs are nearly equal.

Only one species, *Call.* (*Trypaea*) *Filholi* A. M.-Edw., is till now known from New Zealand and Stewart Island, according to Prof. Chilton *Call. ceramica* may once prove to be identical with it. *Call.* (*Callichirus*) *novae-britanniae* Borr. is known from New Britain, but has also been observed in the Maldive Archipelago; a variety, of which the habitat is unknown, of this species

has been described and figured by the author in 1928 in his paper on twenty-two species of the genus *Callianassa*. *Call.* (*Callichirus*) *Bocourti* A. M.-Edw., a species of which the anterior legs are unknown, was captured by Mr. Bocourt "sur les côtes de l'océan Pacifique, à la Union"; probably the Union Islands are meant, that are situated north-east of the Samoa Islands. The Hawaiian Islands are inhabited by *Call.* (*Callichirus*) *articulata* Rathb., a species of small size, 22,4 mm. long, distinguished by the large hemispherical eyes that occupy more than half the length of the stalk and reach to end of it. A specimen of another species was taken on Honolulu Reef, but it was too fragmentary for determination (M. J. Rathbun, The Brachyura and Macrura of the Hawaiian Islands, Wash. 1906, p. 893).

Six species are known from the west coast of North America, one of which should be referred to the subgenus *Calliactites*, while the five others belong to the subgenus *Trypaea* and are partly still imperfectly known. The three species that occur on the west coast of South America, belong also to this subgenus and are species of a large size, 6 to 8 centim. long. *Call. uncinata*, described already in 1837, was found at various localities of the coast of Chile, but lives also in the muddy sand of the inside beach at Capon, Peru; the two others, *Call.* (*Trypaea*) *brachyophthalma* A. M.-Edw. from the Chiloë Islands and *Call.* (*Trypaea*) *chilensis* A. M.-Edw. from Chile are still imperfectly known.

Only two species occur on the east coast of the United States: *Call.* (*Callichirus*) *major* Say which attains a length of four and a half inches, and *Call.* (*Callichirus*) *atlantica* Rathb., a form closely related to the european *Call.* (*Callichirus*) *Pestae* de Man. The West-Indies are inhabited by four species, the little known *Call.* (*Cheramus*) *Batei* Borr. from Sombrero Island, *Call.* (*Cheramus*) *minima* Rathb. and *Call.* (*Callichirus*) *marginata* Rathb., both from Porto Rico, finally *Call.* (*Callichirus*) *longiventris* A. M.-Edw. from Martinique.

Two species are known from South Africa, *Call.* (*Calliactites*) *rotundicaudata* Stebb., which is also found at Ceylon and *Call.* (*Callichirus*) *Kraussi* Stebb., which was taken a little below high water mark. *Call.* (*Callichirus*) *Turnerana* White is a remarkable species, distinguished from all the others by the rostrum terminating into three to five acute spines; it is a fresh-water species which not only occurs in Cameroon, West Africa, but which has even been recorded from Central America under the name of *Call. Krukenbergi* Neumann (vide my quoted paper on twenty-two species of this genus, p. 51). Professor Balss of Munich wrote me about this question "Ob *Call. Turnerana* wirklich in Amerika vorkommt oder ob in Heidelberg eine Etikettenverwechselung vorgekommen ist, dürfte noch zu bestätigen sein". The type specimens of *Call. Krukenbergi* are namely preserved in the Museum of Heidelberg. A second species, *Call.* (*Callichirus*) *guineensis* de Man 1928, was taken at a depth of 5 fathoms at Prampram, Gold Coast, a remarkable form, distinguished probably from all the other species of *Callianassa* by the extraordinary slender shape of the external maxillipeds. The third species from West Africa is *Call.* (*Cheramus*) *pachydactyla* A. M.-Edw., which inhabits the Cape Verde Islands.

Of almost half the number of the described species of *Callianassa* the mode of life is unknown, even the depth at which they live. *Call.* (*Cheramus*) *subterranea* (Montagu) resides, as Leach states, in subterranean passages, similar to those formed by *Upogebia*, it was first found on the coast of Devon, where it appears to be not uncommon. *Call.* (*Callichirus*) *Pestae* de Man likewise lives in the Adriatic and other localities in self-burrowed passages in the sandy

or muddy bottom near the coast and most other species do the same. Many are taken between tide-marks; *Call.* (*Callichirus*) *Kraussi* Stebb. at the Cape of Good Hope, a little below high water mark. Most species occur in rather shallow water from about 5—50 fathoms, but *Call.* (*Cheramus*) *joculatrix*, of which, as already remarked, 38 specimens were collected at ten different Stations, proves that the vertical distribution is sometimes rather variable, the depths at which this species was taken, varying from 7 to 170 fathoms. In the tropical seas many species live on the reefs.

Off Sombrero Island, West-Indies, *Call.* (*Cheramus*) *Batei* was taken by the Challenger Expedition at a depth of 450 fathoms, the greatest at which a species of this genus has been observed. Other deep sea species are *Call.* (*Calliactites*) *caecigena* Alcock and Anderson (200—350 fathoms), *Call.* (*Calliactites*) *lignicola* (185 and 244 fathoms), respectively from the Bay of Bengal and the Andaman Sea, and *Call.* (*Calliactites*) *goniophthalma* Rathb. (278, 322 fathoms) from the west coast of North America.

The Key to the subgenera of *Callianassa* is taken from Mr. L. A. Borradaile's paper "On the Classification of the Thalassinidea", published in: Annals and Magazine of Nat. Hist. Ser. 7, Vol. XII, November 1903, p. 551; also the definitions of the subgenera, these, however, somewhat modified.

Key to the subgenera of the genus *Callianassa* Leach.

I. Eyes flattened against one another, with the cornea usually on the outside.
  1. Propodus of the third legs without a lobe on the hinder edge . . . *Calliactites.*
  2. Propodus of the third legs with a lobe on the hinder edge.
    a. Telson long.
      a. Third maxillipeds narrow . . . . . *Cheramus.*
      b. Third maxillipeds very broad . . . . . *Trypaea.*
    b. Telson short and broad . . . . . *Callichirus.*

II. Eyes rounded, bearing the cornea at the end . . . . . *Scallasis.*

Calliactites Borr.

Definition: Propodus of third legs without a lobe on the hinder edge. External maxillipeds narrow or more or less broadened. Telson of different form, squarish, or trapeziform, with the sides convergent or rounded posteriorly; uropods not much or much longer than telson.

Cheramus Bate.

Definition: Propodus of third legs with a lobe on the hinder edge. Ischium of external maxillipeds longer than broad, with the lateral margins parallel, never converging backwards; ischium therefore not triangular. Telson and inner uropod either longer than broad, with the inner uropod rounded posteriorly or telson a little broader than long with the inner uropod square-ended, nearly as long as broad; telson about as long as or slightly longer than the inner uropod, rarely much shorter than it, in which case the telson is longer than broad.

Trypaea Dana.

Definition: Propodus of third legs with a lobe on the hinder edge. External maxillipeds very broad, operculiform, lateral margins of ischium converging backward, so that this joint appears triangular, presenting its greatest width anteriorly; ischium usually shorter than the greatest width anteriorly, rarely longer than it. Telson more or less distinctly longer than broad, rarely as long as broad. Inner uropod as long or nearly as long as telson, rounded posteriorly, rarely square-ended.

Callichirus Stimps.

Definition: Propodus of third legs with a lobe on the hinder edge. Ischium of external maxillipeds usually longer than broad, with the lateral borders nearly parallel, rarely the ischium appears broader than long with the lateral borders slightly convergent. Telson short, broader than long. Inner uropods much longer than telson, usually more or less distinctly pointed, rarely rounded.

Key to all the species of the genus *Callianassa* Leach, known at present, June 1928.

Subgenus **Calliactites** Borr.

a_1 Posterior margin of telson truncate, blunt or slightly concave, not rounded, uropods not much longer than telson.

b_1 Telson squarish, nearly as long as the 6th segment of the abdomen, sides of telson subparallel and notched at the anterior third, posterior margin slightly concave . . . . . *goniophthalma* Rathbun

(M. J. Rathbun, in: Proc. U. S. Nat. Mus. XXIV, 1902, p. 886 and in: Decapod Crustaceans of the Northwest coast of North America, New York 1904, p. 154, Pl. VIII).

b_2 Telson trapeziform, lateral borders convergent.

c_1 Abdominal terga with lateral (pleural) spines. No trace of corneae. Antennal peduncle longer than that of the inner antennae . . . . . *caecigena* Alcock and Anderson

(A. Alcock and A. R. S. Anderson, in: Journal Asiatic Society Bengal, LXIII, pt. 2, 1894, p. 163. — Illustrations of the Zoology of the Investigator, Crustacea, Pl. XXVI, fig. 2).

c_2 None of the abdominal terga have any lateral (pleural) spines. Eyes small, black and distinct.

d_1 Antennal peduncle longer than that of the inner antennae.

e_1 Merus of external maxillipeds longer than broad. . . . *secura* Lanchester.

(W. F. Lanchester, in: Proc. Zool. Soc. London, December 3, 1901, p. 555, Pl. XXXIV, fig. 2, 2*a*. — J. G. de Man, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. With 148 illustrations on 12 plates. 's Gravenhage 1928, p. 5 (Capita Zoologica).

e_2 Merus of external maxillipeds broader than long. . . . sp. de Man.

d_2 Antennal peduncle shorter than that of the inner antennae. Merus of external maxillipeds broader than long . . . . *lignicola* Alcock and Anderson

(A. Alcock and A. R. S. Anderson, Annals and Mag. of Nat. Hist., London 1899, p. 288. — Illustrations of the Zoology of the Investigator, Crustacea, Pl. XLII, fig. 2).

a_2 Telson rounded posteriorly, without or with a small median tooth, uropods considerably longer than telson.

f_1 Telson almost circular, a little broader than long, without a small median tooth. The first two abdominal segments are coalesced. Merus of external maxillipeds broader than long *rotundicaudata* Stebbing

(Th. R. R. Stebbing, South African Crustacea, Part II, 1902, p. 41, Pl. 8).

f_2 Telson a little longer than broad, with small median tooth on the rounded posterior margin. The first two abdominal segments are not coalesced. Merus of external maxillipeds a little longer than broad, anterior border armed with a small tooth or spine. . . . . *modesta* de Man

Subgenus **Cheramus** Bate.

a_1 Inner uropod oval or pear-shaped. Ischium and merus of external maxillipeds, taken together, at least $2^1/_2$-times as long as broad [1]).

b_1 Rostrum triangular, acute, short, extending only along one-fourth the length of the eyestalks.

Telson as long as broad, posterior margin indistinctly defined, slightly emarginate in the middle and bearing here a microscopical acute tooth, that just reaches beyond the margin. Merus of larger cheliped with 5 or 6 small teeth on the proximal part of the upper border and with the proximal fourth part of the lower produced to a large flattened tooth, of which the distal edge ends into an acute point. . . . . *subterranea* (Montagu)

(G. Montagu, Trans. Linn. Soc. London, IX, 1808, p. 89, T. III, fig. 1, 2.— Th. Bell, A History of the British Stalk-eyed Crustacea. London 1853, p. 217. — J. G. de Man, l. c. p. 6, Pl. I, fig. 1—1*g*).

b_2 Rostrum a more or less long spine, often longer than the eyestalks.

c_1 Telson oblong-triangular, with a few lateral marginal spinules on each side.

Rostrum a slender spine, a little longer than the eyestalks and inclined downward. Cornea near end of eyestalk. Merus of larger cheliped oblong-oval, unarmed . . . . . *minima* Rathb.

(M. J. Rathbun, The Brachyura and Macrura of Porto Rico. Wash. 1901, p. 92, fig. 16).

1) In *Call. praedatrix* de Man only twice as long as broad; of *Call. Batei* Borr. and *Call. intermedia* de Man the external maxillipeds are unknown.

c_2 Telson slightly longer than broad, posterior margin slightly concave, with no median tooth or spine.

Rostrum lamellar, strongly compressed, with sharp upper edge, acuminate, as long as 1st joint of antennular peduncle. Uropods considerably longer than telson. Third joint of antennular peduncle 4-times as long as 2nd, antennal peduncle reaching with its terminal joint beyond that of the inner antennae . *Sibogae* de Man

c_3 Posterior margin of telson rounded or truncate, with median spine.

d_1 Posterior margin of telson regularly rounded. Merus of external maxillipeds broader than long, with a spine on the anterior margin. Merus of smaller cheliped of the female with a spine on the lower margin, carpus shorter than chela. *propinqua* de Man

d_2 Posterior margin of telson truncate. (Confer the variety from Stat. 2). Merus of external maxillipeds almost twice as long as broad, unarmed. Merus of smaller cheliped unarmed, carpus longer than chela (Confer the variety from Stat. 2) . . . *joculatrix* de Man.

c_4 Posterior margin of telson more or less distinctly emarginate or notched, with a median tooth or spine.

e_1 Terminal joint of antennal peduncle much shorter than the penultimate, shorter than half the length of the latter.

f_1 Posterior margin of telson with a very rudimentary point at the bottom of a slight depression, telson a little broader anteriorly than it is long . . . . . *orientalis* (Bate)

(C. Spence Bate, Report on the Challenger Macrura 1888, p. 30, Pl. I, fig. 2. — J. G. de Man, l. c. p. 9, Pl. I, fig. 2, 2*a*).

f_2 Posterior margin of telson concave, with a well-developed median spine. Telson a little longer than broad . . . *Batei* Borr.

L. A. Borradaile, in: Annals and Magazine Nat. Hist. Ser. 7, Vol. XII, November 1903, p. 546. — C. Spence Bate, l. c 1888, p. 32, Pl. II, fig. 1. — J. G. de Man, l. c. p. 10, Pl. I, fig. 3).

e_2 Terminal joint of antennal peduncle little shorter than the penultimate, measuring at least more than half the length of the latter.

g_1 Antennal peduncle much longer than that of the inner antennae.

h_1 Upper border of merus of larger cheliped armed with a spine near the proximal extremity. Antennular flagella much longer than their peduncle.

i_1 Third joint of antennular peduncle almost 4-times as long as 2nd, tapering, almost 5-times as long as thick. *lobetobensis* de Man

i_2 Third joint of antennular peduncle $2^1/_2$-times as long as 2nd, cylindrical, little more than twice as long as thick . *intermedia* de Man

h_2 Upper border of merus of larger cheliped unarmed. Antennular flagella little longer than their peduncle.

Anterior margin of merus of external maxillipeds armed with a spine . . . . . *praedatrix* de Man

g_2 Antennal peduncle barely longer than that of the inner antennae. Antennular flagella nearly as long as their peduncle.

j_1 Telson longer than broad. Inner uropod without a spine on the anterior border. Segments of the lower thinner flagellum nine in number, slender, those in the middle twice as long as thick. . . . . *pugnatrix* de Man

j_2 Telson one-seventh broader than long. Inner uropod with an immovable spine on the anterior border. Segments of the lower thinner flagellum thirteen in number, of a stout shape, those in the middle little longer than thick . . . . . *pygmaea* n. sp.

a_2 Inner uropod square-ended.

k_1 Telson a little broader than long, truncate or slightly emarginate. Merus of external maxillipeds as long as broad or broader than long.

l_1 Rostrum triangular, acute, extending to the middle of the corneae of the eyestalks.

Abdominal appendages of the 1st pair of the male terminating distally into two lobes, of which the inner is obtuse, the outer hook-shaped, the hook being acute, reaching beyond the inner lobe and curved inward . . . . . *moluccensis* de Man

l_2 Rostrum triangular, obtuse or rounded, much shorter than the distance between its apex and the corneae.

m_1 Propodus of external maxillipeds longer than broad.

n_1 Upper border of the ischium of the larger cheliped smooth, unarmed. Carpus of the larger cheliped of the male shorter than the palm.

o_1 Anterior legs in the male very unequal. Carpus of smaller cheliped of the male slender, 4-times as long as broad, longer than the chela. Carpus of the larger cheliped of the female longer than the palm . . . . . *mauritiana* Miers

(E. J. MIERS, in: Proc. Zool. Soc. London, 1882, p. 341 and 1884, Pl. I, fig. 2, 2*a*. — J. G. DE MAN, l. c. p. 10, Pl. II, figs. 4, 4*c*).

o_2 Anterior legs in the male of different size, but subequal as regards their shape, in both legs

the carpus shorter than the palm. Abdominal appendages of the 1st pair of the male as in *Call. moluccensis* de Man . . . . . *Jousseaumei* Nobili.

(G. Nobili, in: Annales des Scienc. Nat. 9e Série. Zool. T. IV. Paris 1906, p. 101, Pl. VI, fig. 2).

n_2 Upper border of the ischium of the larger cheliped denticulate on its proximal half. Carpus of both chelipeds in the male longer than the palm. . . . . *Calmani* Nobili

(G. Nobili, in: Annales des Scienc. Nat. 9e Série. Zool. T. IV. Paris 1906, p. 104, Pl. V, fig. 2).

m_2 Propodus of external maxillipeds broader than long.

p_1 Rostrum pointed, like also the eyestalks. Second joint of antennular peduncle more than twice as long as thick . . . . . *pachydactyla* A. M.-Edw.

(A. Milne-Edwards, in: Nouv. Archives du Muséum. Mémoires. T. VI. Paris 1870, p. 86, Pl. II, fig. 1 à 1*d*).

p_2 Rostrum obtusely rounded, very short. Second joint of antennular peduncle one-third longer than thick. Anterior extremity of the eyestalks rounded or truncate and denticulate.

Abdominal appendages of 1st pair uniramous, slender, short filaments, compressed, somewhat widening distally and terminating into two rounded lobes . . . . . *indica* de Man

k_2 Telson once and a half as long as broad in the middle, terminating posteriorly into an obtuse point. Merus of external maxillipeds twice as long as broad, external maxillipeds with well-developed exopodite. Corneae near the tip of the pointed eyestalks. Rostrum conical, reaching to the middle of the eyestalks. A species of small size, length 13 mm. . . . . *minor* Gourret

(P. Gourret, Révision des Crustacés Podophthalmes du Golfe de Marseille suivie d'un essai de classification de la Classe des Crustacés. Marseille 1888, p. 96, Pl. VIII, figs. 1—15).

Subgenus **Trypaea** Dana.

a_1 Merus of larger cheliped in the male with a prominent lobe or tooth at its infero-proximal angle

b_1 Inner margins of the eyestalks produced anteriorly into a short spine, projecting upwards and forwards. Upper and lower

margins of carpus and palm of larger cheliped produced into thin flat crests, the upper margin of the carpus being produced proximally into a small rounded lobe and the lower margin produced downwards into a large rounded lobe towards the distal end . . . . . *Filholi* (A. M.-Edw.)

(A. Milne-Edwards, in: Bull. Soc. Philomath. Paris 1878, 7. Sér. T. III, p. 112. — H. Filhol, in: Mission de l'île Campbell, III. – 2e Part., N° 1, Zoologie, 1885, p. 429 et 491, Pl. LIII, fig. 10—12. — J. G. de Man, in: Bull. Muséum d'hist. nat., Paris 1905, N° 6, p. 416. — Ch. Chilton, in: Transact. New Zealand Institute, Vol. XXXIX, 1906, p. 461, Pl. XVI, figs. 1 to 5).

b_2 No short spine anteriorly on the eyestalks. Margins of carpus and palm of the larger cheliped not produced into thin flat crests or lobes.

c_1 Carpus of the larger cheliped in the male, measured along the upper border, markedly shorter than the palm; when barely shorter, then are the distal end of the palm and the fingers concealed by hair.

d_1 Telson truncate, as long as the inner uropods. Carpus of smaller cheliped in the male a little more than half as broad as long, longer than the chela . . . . . *italica* Parisi

(B. Parisi, in: Monitore Zool. Italiano, Anno XXVI, N° 3, Firenze 1915, p. 64, figs. 1 and 2. — J. G. de Man, l. c. p. 11, Pl. II, fig. 5—5*h*).

Here also belongs *Call. truncata* Giard and Bonnier, a species with which *Call. italica* is perhaps identical.

(A. Giard et J. Bonnier, in: Bull. Scientif. de la France et de la Belgique, Tome XXII, Paris 1890, p. 362—366, fig. 2 et 4).

d_2 Telson broadly rounded and shorter than the uropods. Carpus of smaller cheliped in the male narrow, as long as the chela. . . . . *affinis* Holmes

(S. J. Holmes, in: Occasional Papers of the California Acad. of Sciences. VII. San Francisco 1900, p. 162, Pl. II, figs. 29, 30).

c_2 Carpus of the larger cheliped in the male as long as or nearly as long as the palm.

e_1 Merus of larger cheliped slender, 4-times as long as broad proximally, the tooth at the infero-proximal angle inclusive.

Fingers of larger chela half as long as the palm, not gaping, not dentate within.

Length of chela of smaller cheliped measuring three-fourths the length of the carpus . . . . . *gigas* Dana

(J. D. Dana, United States Explor. Exped. Crustacea. Part I, 1852, p. 512, Pl. 32, figs. 3*a*—3*d*. — W. Stimpson, in: Journ. Boston Soc. of Nat. Hist. Vol. VI, Cambridge 1857, p. 49, Pl. XXI, fig. 3).

e_2 Merus of larger cheliped of a more or less stout shape, less than 4-times as long as broad, the tooth at the infero-proximal angle inclusive.

f_1 Chela of larger cheliped of the male of a slender shape, twice as long as broad.

Upper border of merus of larger cheliped of the male straight, not convex.

Fingers of smaller cheliped of equal length . . . . *longimana* Stimps.

W. Stimpson, in: Proc. Boston Soc. Nat. Hist. VI, p. 86 and Journ. Boston Soc. Nat. Hist. Vol. VI, Cambridge 1857, p. 50, Pl. XXI, fig. 5. — S. J. Holmes, in: Occasional Papers Calif. Acad. Nat. Sciences VII, San Francisco 1900, Pl. II, fig. 28).

f_2 Chela of larger cheliped of the male of a stout shape, less than twice as long as broad.

g_1 Extremity of dactylus of larger cheliped of the male abruptly bent downward, hooked, the prehensile edge with a truncate tooth at the base, dactylus longer than the fixed finger.

h_1 Dactylus of larger cheliped in the male with no subterminal tooth near the tip; palm of this cheliped deeply hollowed out distally close by the immovable finger.

Carpus of smaller cheliped a little shorter than the chela . . . . . *uncinata* H. M.-Edw.

(H. Milne-Edwards, Histoire Nat. Crustacés, II, 1837, p. 310, Pl. 25bis, fig. 1—3).

h_2 Dactylus of larger cheliped in the male near the tip with a subterminal obtuse tooth, which is nearly half as broad as the truncate, basal tooth; palm of this cheliped only a little hollowed out distally close by the immovable finger.

Carpus of smaller cheliped a little longer than the chela . . . . . *Harmandi* Bouv.

(E. L. Bouvier, in: Bulletin Muséum d'Hist. Nat., 1901, p. 332. — J. G. de Man, l. c. p. 13, Pl. III, figs. 6—6*j*).

g_2 Dactylus of larger cheliped in the male straight or slightly curved distally, never abruptly bent downward or hooked.

i_1 Frontal border of the carapace presenting in the middle a large, rounded, obscurely trilobate lobe. Telson as long as the uropods. Upper border of merus of larger cheliped a little convex, rather sharp, smooth, unarmed; lower border produced proximally into a flattened triangular, acute tooth, the posterior straight margin

of which is finely denticulate; this tooth is comparatively of a smaller size than in *Call. californiensis* Dana, its variety *japonica* Bouv., *Call. Harmandi* Bouv. and *Call. uncinata* H. M.-Edw.; it has also a different shape. Carpus a little longer than broad, lower border sharp, not serrulate. Dactylus a little shorter than the palm, which slightly narrows distally; prehensile edge expanded in the middle to a rounded elongate-triangular lobe that occupies half the length of the finger and the free edge of which is finely crenulate. There is but a fine narrow incision between the distal lobe of the palm and the fixed finger which is finely crenulate on its proximal half. . . . . *chilensis* A. M.-Edw.

(A. Milne-Edwards, in: Annales Scienc. Nat. 4e Série. Zoologie. Paris 1860, T. XIV, p. 302 (footnote) and in: Nouv. Archives du Muséum. Mémoires T. VI. Paris 1870, p. 84. — J. G. de Man, l. c. p. 15, Pl. III, figs. 7—7c.

i_2 Rostrum very short, rounded, a little less prominent than the obtuse lobe between eyestalk and antennal peduncle. Eyestalks almost twice as long as broad at their base, inner margins contiguous until near the tips that are obtusely pointed, outer margins slightly concave anteriorly in front of the corneae; corneae black, reticulate, oval, their longer axis measuring one-third the length of the stalk, a little farther distant from the base than from the tip. Antennular flagella nearly as long as the peduncle, not longer; 2nd joint of the peduncle twice as long as thick, 3rd slender, tapering, twice as long as 2nd; thinner flagellum a little longer than the other.

External maxillipeds operculiform, ischium triangular, with the lateral borders convergent backward, length of the merus about two-thirds that of the ischium, propodus not dilated, dactylus slender. The fingers of the larger cheliped shut close together and are finely denticulate. Ischium of smaller cheliped slender, 4-times as long as broad in the middle, merus one-sixth shorter than ischium, with the lower margin, like that of the ischium, unarmed; carpus a little more than one and a half times as long as the merus, 3-times as long as broad, chela a little shorter than the carpus, palm barely longer than broad, as long as the fixed finger,

that bears 8 or 9 small low teeth in the middle; fingers very hairy . . . . . *Rochei* Bouv.

(E. L. Bouvier, in: Bull. Muséum d'Hist. Nat., Paris 1895. Année 1895, N° 1, p. 7. — J. G. de Man, l. c. p. 17, Pl. IV, figs. 8—8*d*).

i_3 Rostral point short, but well-defined and extending considerably beyond the lateral angles that are only faintly indicated. Telson as long as the 6th segment of the abdomen, both of the uropods longer than the telson. Eyestalks rounded, contiguous, cornea small, only slightly pigmented. Ischium and merus of external maxillipeds rounded and much swollen, with their line of junction wide and truncated, the two joints together being subglobose.

Merus of larger cheliped with a long anterior crest on its lower margin, near its proximal end a well-defined tooth-like lobe, both evenly serrate on the edge. Carpus three-fourths as long as broad, as long as the subquadrate palm, of which the surface is deeply pitted on its lower half. Dactylus slightly longer than the fixed finger, almost straight, with a faintly indicated tooth on its distal half and a strongly doubly crowned molar-like tooth near the articulation.

Carpus of smaller cheliped almost as long as the chela and presenting the same breadth, fingers separated by a wide interval, dactylus with a small tooth on its distal third.

Closely related to *Call. Filholi* A. M.-Edw. and perhaps identical . . . . . *ceramica* Fulton and Grant

(S. W. Fulton and F. E. Grant, in: Proc. Roy. Soc. Victoria, Vol. XIX, (New Series) Pt. 1, Melbourne 1906, p. 12, Pl. V).

c_3 Carpus of the larger cheliped of the male markedly longer than the palm.

j_1 Front not triangular. Telson about as long as broad, nearly rounded at apex. Antennular flagella shorter than last basal joint. Merus of external maxillipeds broader than the triangular ischium, of which the lateral borders converge backward.

Merus of larger cheliped with a cultriform process below near base. Chela of larger cheliped little longer than carpus, fingers nearly half as long as the chela, not gaping, finely denticulate within. Lower as well as upper edge of palm, carpus and merus acute. . *australiensis* Dana

(J. D. Dana, United States Explor. Exped. Crustacea. Part. I. 1852, p. 513, Pl. 32, fig. 4*a*—*c*).

j_2 Front very short and rounded. Merus of the larger cheliped in the male stout, curved, not yet twice as long as broad at its base, the tooth at its infero-proximal angle included; upper border of merus convex. Carpus very broad, its outer side evenly convex, margins acute, ciliated and minutely serrulated; palm less broad and distinctly shorter than the carpus, narrowing distally, fingers a little longer than the palm, dactylus longer than the immovable finger with hooked extremity, the tip being abruptly bent downward; chela not yet twice as long as broad. Chela of smaller cheliped shorter than the carpus, dactylus longer than the fixed finger, not hooked at the tip, fingers not gaping . . . . . *californiensis* Dana

(J. D. DANA, Proc. Acad. Nat. Sc. Philadelphia 1854, p. 175. — W. STIMPSON, Journ. Boston Soc. Nat. Hist., Vol. VI, 1857, p. 489, Pl. XXI, fig. 4. — S. J. HOLMES, in: Occasional Papers Calif. Acad. of Sciences. San Francisco 1900. VII, p. 159, Pl. II, fig. 27).

j_3 Front exactly as in *Call. japonica* (Ortm.), broadly triangular, tipped with a separate subacute point at the apex, short, extending only along one-fifth the length of the eyestalks. Also in all other respects fully agreeing with *Call. japonica*, even as regards the number of segments of the antennular flagella, 18 for the thinner, 25 for the thicker flagellum. The only difference is presented by the anterior legs, which almost completely show the form and the characters of *Call. californiensis* Dana; according to Prof. BOUVIER the palm should narrow less considerably distally and the interspace between the fingers should be larger.

Smaller cheliped differing only from that of *Call. japonica* by the chela being a little longer in proportion to the carpus and by the fingers being a little longer in proportion to the palm.

Perhaps the full-grown animal of *Call. japonica* (Ortm.). . . . . *californiensis* Dana var. *japonica* Bouv.

(E. L. BOUVIER, in: Bull. Mus. d'Hist. Nat. Paris 1901, p. 332. — J. G. DE MAN, l. c. p. 18, Pl. IV, fig. 9—9*e*).

j_4 Rostrum broadly triangular, with a separate subacute point at the apex, short, extending only along one-fifth the length of the eyestalks, lateral prominences between eyestalk and antennal peduncle half as long.

Eyestalks a little more than half as broad as long, with obtuse tip, cornea on the middle of the upper surface. Second joint of antennular peduncle twice as long as thick, 3rd slender, twice as long as 2nd and 7-times as long as broad in the middle; longer thinner flagellum as long as the peduncle and composed of 18 segments, the other, one-ninth shorter, consists of 25 segments.

Margins of ischium of external maxillipeds convergent, merus a little shorter than two-thirds the length of the ischium.

Telson almost as broad as long, lateral margins in their anterior half parallel, then slightly converging and curving into the not defined, slightly concave, posterior margin, that bears a microscopical spinule in the middle; uropods little longer than telson.

Merus of larger cheliped in the male not yet twice as long as broad at its base, the tooth at its infero-proximal angle included, this tooth rather small as in *Call. chilensis*, terminating in a sharp point, with the lower margin straight or a little convex, finely denticulate; upper border of merus convex, armed along the two proximal third parts with a dozen of small acute granules that become smaller distally. Carpus and chela nearly as in *Call. californiensis*, but the carpus proximally not broader than distally. Dactylus a little longer than the fixed finger, not longer than the palm, tip not hooked. Chela of smaller cheliped a little shorter than the carpus, dactylus a trifle longer than the fixed finger. . . . . *japonica* Ortm.

(A. Ortmann. in: Zoolog. Jahrb. (Spengel) VI. Abth. f. Syst. Jena 1891, p. 55, Taf. I, fig. 10*a*. — H. Balss, in: Archiv f. Naturg. 90. Jahrg. 1924. Abth. A. 5. Heft, p. 52. — J. G. de Man, l.c. p. 19, Pl. V, figs. 10—10*l*).

j_5 Rostrum small, subacute. Merus of the larger cheliped in the male, stout, not yet twice as long as broad at its base, the tooth at its infero-proximal angle inclusive, upper border of merus straight; carpus oblong, with the margins subparallel, outer surface very convex; chela slender, twice as long as broad, fingers shorter than the palm, dactylus a little longer than the fixed finger. Chela of smaller cheliped a little shorter than the carpus, fingers long, contiguous, of equal length *longimana* Stimps.

(W. Stimpson, in: Proc. Boston Soc. Nat. Hist. VI, p. 86 and Journal

Boston Soc. Nat. Hist. Cambridge 1857. Vol. VI, p. 50, Pl. XXI, fig. 5. — S. J. HOLMES, in: Occasional Papers Calif. Acad. Nat. Sciences. San Francisco 1900. VII. p. 159, Pl. II, fig. 28).

a_2 Merus of larger cheliped in the male with no prominent lobe or tooth at its infero-proximal angle.

k_1 Merus of larger cheliped armed with spines or acute teeth on the lower border.

l_1 Carpus of larger cheliped shorter than palm.

m_1 Merus of larger cheliped with no denticles on the upper border, lower border of palm with a row of blunt denticles internally.

Propodus of 3rd legs twice as long as broad, posterior lobe well-developed . . . . . *maldivensis* Borr.

(L. A. BORRADAILE, Marine Crustaceans. XIII. The Hippidea, Thalassinidea and Scyllaridea, in: The Fauna and Geography of the Maldive and Laccadive Archipelagoes. 1904. Vol. II, Part 3, p. 753, Pl. LVIII, fig. 3*a*, 3*b*. — J. G. DE MAN, l. c. p. 22).

m_2 Merus of larger cheliped denticulate on the proximal part of the upper border, lower border of palm unarmed.

Propodus of 3rd legs with the posterior lobe barely developed, the propodus one and a half times as long as broad . . . . . *Bouvieri* Nobili

(G. NOBILI, Faune Carcinologique de la Mer Rouge. Paris 1906, p. 105, Pl. VI, fig. 3 (Annales des Scienc. Natur. 2e Série. Zoolog. T. IV).

l_2 Carpus of larger cheliped longer than palm.

To this section belong *Call. Gravieri* Nobili

(G. NOBILI, Faune Carcinologique de la Mer Rouge. Paris 1906, p. 107, Pl. VI, fig. 4)

and *Call. cristata* Borr.

(L. A. BORRADAILE, in: The Transactions Linnean Soc. London. 2nd Ser. Zoology. Vol. XIII. Part 2, p. 263, Pl. 16, fig. 7).

These two species, of which the former, in one specimen only, was collected at Obock, the latter, also in one specimen, at Salomon Atoll, Chagos Archipelago, are in my opinion probably identical [1])

(Confer: J. G. DE MAN, l. c. p. 23, Pl. VI, fig. 11—11*e*).

k_2 Merus of both chelipeds unarmed below.

No spine on the anterior border of the merus of the external maxillipeds . . . . . *amboinensis* de Man

1) Having applied to Dr. BORRADAILE for information, he wrote me the following: "Unfortunately the specimen of *Call. cristata* is not in our Museum. All the specimens in the Collection which contained it, were sent to the Museum after they had been reported upon, and I fear therefore that it must have been mislaid and that unless it presently turns up there is no hope that it will be able to be examined". The diagnosis of *Call. cristata* is too succinct and only one figure is given.

Subgenus **Callichirus** Stimps.

a_1 Rostrum simple.

b_1 Frontal margin trispinose.

c_1 Propodus of 3rd legs not trilobate.

d_1 Cornea terminal, occupying the distal third or half of the eyestalks.

e_1 Merus of external maxillipeds just or nearly as broad as long, with no spinule on the anterior margin and just or nearly as broad as the propodus. Cornea shorter than half the length of the stalk.

f_1 Second segment of abdomen much, viz., one-third, longer than sixth. Peduncles of inner and outer antennae of subequal length.

g_1 Second joint of antennular peduncle 2,2-times as long as thick. Merus of smaller cheliped distinctly shorter than carpus, carpus distinctly longer than palm, fingers one-fourth longer than the palm . . . . . *longiventris* A. M.-Edw.

(A. Milne-Edwards, Nouv. Archives du Muséum, Mémoires, Tome VI, 1870, p. 92. — J. G. de Man, l. c. p. 24, Pl. VI, figs. 12—12*h*).

g_2 Second joint of antennular peduncle 4-times as long as thick. Merus, carpus, palm and fingers of smaller cheliped all nearly of the same length . . . . . *longiventris* A. M.-Edw. var. *Borradailei* de Man

(J. G. de Man, l. c. p. 27).

f_2 Second and sixth segment of abdomen of equal length. Antennal peduncle reaching with two-thirds the terminal joint beyond the peduncle of the inner antennae.

Carpus of smaller cheliped a little shorter than palm, fingers nearly as long as the palm, not longer. . . . *placida* de Man

e_2 Merus of external maxillipeds one and a half times as broad as long, with a spinule on the anterior margin and nearly twice as broad as the propodus. Cornea large, occupying more than half the length of the stalk.

Lateral frontal spines articulated at their base.

Antennal peduncle much longer than that of the inner antennae . . . . . *articulata* Rathbun

(M. J. Rathbun, The Brachyura and Macrura of the Hawaiian Islands. Wash. 1906, p. 892, fig. 47 in: U.S. Fish Commission Bull. for 1903, Part III).

d_2 Cornea placed on the dorsal surface of the eyestalks.

h_1 Outer uropod consisting of two parts of which the anterior is much shorter than the posterior. Inner uropod lanceolate, pointed.

i_1 Upper border of palm of larger cheliped unarmed.

j_1 Lower border of the ischium of the larger cheliped crenulate, presenting a dozen of small and obtuse teeth, but no acute spines. Fingers of smaller cheliped shorter than the palm, gaping.

Outer uropod with no spinules near the proximal end of its posterior border, its anterior part reaching beyond the middle . . . . . *Martensii* Miers

(E. J. Miers, in: Proceed. Zoolog. Soc. London, 1884, p. 13, Pl. I, fig. 1).

j_2 Lower border of the ischium of the larger cheliped armed with a dozen of acute spines, that increase in length distally.

Fingers of smaller cheliped longer than the palm, shutting close together. Outer uropod with one or two spinules near the proximal end of its posterior border, its anterior part reaching just to the middle.

k_1 Eyestalks one-fourth longer than broad at base, corneae rather large, almost as far distant from the frontal margin as they are long or broad. Outer uropod with one spinule near the proximal end of the inner border . . . . . *assimilis* n. sp.

(Syn.: *Callianassa Martensi* J. G. de Man, in: Archiv für Naturgeschichte, 53. Jahrg. Berlin 1888, p. 482, Taf. XXI, fig. 1).

k_2 Eyestalks twice as long as broad at base, corneae rather small, about twice as far distant from the frontal margin as they are long. Outer uropod with two spinules near the proximal end of the inner border *Coutierei* Nobili

(G. Nobili, Faune Carcinologique de la Mer Rouge, Décapodes et Stomatopodes. Paris 1906, p. 110, Pl. VII, fig. 1 (Annales des Sciences Nat., 9e Série, Zool. T. IV).

i_2 Upper border of palm of larger cheliped armed with 3 or 4 spines on the distal half.

Lower border of ischium spinose; fingers of the smaller cheliped gaping, nearly as long as the palm. Outer uropod unarmed. Length of telson one-third that of sixth segment . . . . . *armata* A. M.-Edw.

(A. Milne-Edwards, in: Nouv. Archives du Muséum, Mémoires, Paris 1870, T. VI, p. 90, Pl. I).

h_2 The two parts of the outer uropod extend equally far. Inner uropod triangular, apical angle obtuse.

Terminal, flattened, rounded lobe of the eyestalks armed with a microscopical acute tooth . . . . . *vigilax* de Man

(J. G. de Man, in: Zoologische Mededeelingen uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Leiden 1916. Deel II, p. 57, Pl. I, figs. 1—6).

c_2 Propodus of 3rd legs trilobate.

Antennal peduncle shorter than that of the inner antennae.

l_1 Third joint of antennular peduncle $2^1/_4$-times as long as 2nd, antennal peduncle extending beyond the middle of 3rd joint of the peduncle of the inner antennae.

Merus and carpus of smaller cheliped devoid of spines. Measured along the upper border, the carpus of this leg appears as long as the palm, fingers nearly as long as the palm . . . . . *tridentata* von Martens

(E. C. von Martens, in: Monatsber. Kön. Preuss. Akad. Wissens. zu Berlin, Nov. 1868, p. 614. — J. G. de Man, l. c. p. 27, Pl. VII, figs. 13—13*h*).

l_2 Third joint of antennular peduncle almost 3-times as long as 2nd, antennal peduncle reaching not yet to the middle of the 3rd joint of the peduncle of the inner antennae.

Merus of smaller cheliped with a spine at the proximal end of the lower border, carpus with one spine at the distal end of the upper border and with two at that of the lower. Measured along the upper border, the carpus appears longer than the palm, palm shorter than fingers . . . . . *Grandidieri* Cout.

(H. Coutière, in: Bulletin du Muséum d'histoire naturelle. Paris 1899. N° 6, p. 285).

b_2 Frontal margin with no lateral spines.

m_1 Merus of larger cheliped armed with a more or less strong tooth on the proximal end of the lower border.

n_1 Rostrum a long spine, longer than the eyestalks, as long as basal joint of antennular peduncle.

Inner uropods lanceolate, nearly twice as long as broad.

Antennular peduncle very long, longer than that of the outer antennae. Tooth near the proximal end of the lower border of the merus of the larger cheliped spiniform, hooked. Carpus of both chelipeds a little shorter than the palm. Propodus of 3rd legs trilobate . . . . . *Rosae* Nobili

(G. Nobili, Faune Carcinologique de la Mer Rouge. Décapodes et Stomatopodes. Paris 1906, p. 108, Pl. VII, fig. 2 (Annales des Scienc. Nat., 9e Série. Zool. T. IV).

n_2 Rostrum short, reaching along one-third the length of the eyestalks or shorter [1]).

1) To this section n_2 probably also belongs *Lepidophthalmus Eiseni* Holmes from Lower California, a species which has been

o_1 Inner uropods very narrow, about 4-times as long as broad, almost styliform.

Merus of larger cheliped with the upper border deeply emarginate proximally and granulated, lower and anterior surface granulated, upper smooth, proximal tooth large, granulated above and below. Carpus of larger cheliped twice as long as the merus, longer than the palm, dactylus strongly curved, hooked, with the upper border denticulate at the inner side *major* Say

(TH. SAY, An Account of the Crustacea of the United States, in: Journal Acad. Nat. Science Philadelphia. Philadelphia 1818. Vol. I, Part II, p. 238. — J. G. DE MAN, l. c. p. 30, Pl. VII, Fig. 14—14*b*, Pl. VIII, fig. 14*c*, 14*d*).

o_2 Inner uropods not very narrow, not almost styliform, at least half as broad as long.

p_1 Propodus of external maxillipeds longer than broad.

Third joint of antennular peduncle 3- or more than 3-times as long as 2nd.

q_1 Width of carpus of smaller cheliped more than one-third its length. Telson barely broader than long . . . . . *laticauda* Otto

(A. W. OTTO, Beschreibung einiger neuen, in den Jahren 1818 und 1819 im Mittelländischen Meere gefundener Crustaceen. Bonn 1828, p. 345, Tab. XXI, Fig. III [Nova Acta Acad. Leopold. XIV 1]. — J. G. DE MAN, l. c. p. 33, Pl. VIII, fig. 15—15*d*.

q_2 Width of carpus of smaller cheliped less than one-third its length.

r_1 Sixth segment of abdomen only one-seventh broader than long, with the lateral borders almost parallel. Telson almost one and a half times as broad as long. Eyestalks contiguous until near the tip. Third joint of antennular peduncle 3-times as long as 2nd, this peduncle as long as that of the outer antennae. . . . . *Pestae* de Man

(J. G. DE MAN, l. c. p. 34, Pl. IX, figs. 16—16*e*).

r_2 Sixth segment of abdomen one-fourth broader than long, with the lateral borders distinctly

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referred by Prof. BALSS to the genus *Glypturus* Stimps. (in: Zoolog. Anzeiger, Bd. LXI, 1924, p. 180), wrongly, however, because the ischium and the merus of the external maxillipeds are much dilated, even broader than the propodus. In my opinion there is no reason for not including it into the genus *Callianassa* (S. J. Holmes, in: Proc. California Acad. of Sciences. Third Series. Zoology. Vol. III 1901—1904. San Francisco 1904, p. 307, Pl. XXXV, figs. 7—13). According to the figure 8 the inner uropod should be rather narrow, about 3-times as long as broad, much longer than the telson; lower border of merus of larger cheliped with a sharp spine at the proximal end, carpus of larger cheliped little longer than the upper border of the palm, in the smaller cheliped of the male about twice as long.

converging backward, and narrowed at the posterior third. Telson only one-seventh broader than long. Third joint of antennular peduncle 4-times as long as 2nd, this peduncle distinctly longer than that of the outer antennae, the third joint extending beyond the latter with its distal third.

Inner margins of the eyestalks diverging from the base to the tips that are slender, turned outward and upward . . . . . *atlantica* Rathb.

(S. J. SMITH, in: A. E. VERRILL and S. J. SMITH, Report on the invertebrate animals of Vineyard Sound and the adjacent waters, p. 549, Pl. II, fig. 8 (United States Commission of Fish and Fisheries. Part I. Report on the condition of the Sea Fisheries of the South coast of New England in 1871 and 1872 by SPENCER F. BAIRD. With supplementary papers. Wash. 1873). — M. J. RATHBUN, in: Smithsonian Institution, United States National Museum. Bulletin 138. Wash. 1926, p. 107, foot-note. — J. G. DE MAN, l. c. p. 37, Pl. IX, figs. 17—17*d*).

p_2 Propodus of external maxillipeds much broader than long. Third joint of antennular peduncle less than one and a half times the length of the 2nd . . . . . *maxima* A. M.-Edw.

(A. MILNE-EDWARDS, in: Nouv. Archives du Muséum. Paris 1870. Mémoires, Tome VI, p. 97, Pl. II, fig. 5—5*b*. — STANLEY KEMP, in: Memoirs Indian Museum. Calcutta 1915, Vol. V, p. 252, textfigures 21*a*—*f*, Pl. III, fig. 1—5).

m_2 Merus of larger cheliped with no strong tooth on the proximal end of the lower border.

s_1 Second joint of antennular peduncle shorter than third.

t_1 Antennular peduncle a little shorter than that of the outer antennae.

u_1 Rostrum an acuminate spine that reaches to the middle of the eyestalks or a little beyond them.

v_1 Outer uropod little – nearly one-fourth – longer than broad, outer raised part of this uropod reaching barely to the middle, inner uropod triangular. Propodus of external maxillipeds expanded, almost as broad as the merus . . . *mucronata* Strahl

v_2 Both uropods narrow oblong, more than twice as long as broad, outer raised part of this uropod reaching

almost to the distal end; inner uropods about three-fifths the length of the outer. Propodus of external maxillipeds not exceeding half the width of the merus — *marginata* Rathb.

(M. J. RATHBUN, The Brachyura and Macrura of Porto Rico. Wash. 1901, p. 92, fig. 15*a—d* in: U. S. Fish Commission Bulletin for 1900, Vol. 2).

u_2 Rostrum very small, measuring one-sixth the length of the eyestalks, broader at its base than long and rather obtuse.

Outer uropod regularly oval, one and a half times as long as broad, with the margins regularly rounded, outer raised part reaching to near the apical border; inner uropod triangular, almost twice as long as wide. Propodus of external maxillipeds much expanded, almost as broad as the merus . . . . . — *audax* de Man

t_2 Antennular peduncle much longer than that of the outer antennae.

w_1 Fingers of smaller cheliped broadened, the fixed finger spoon-shaped, its margins, like those of the dactylus, pectinate, armed with many acute teeth; these fingers 5-times as long as the palm — *madagassa* Lenz and Richters

(H. LENZ und F. RICHTERS, Beitrag zur Krustaceenfauna von Madagascar, Frankfurt am Main 1881, p. 7, fig. 20—23. — J. G. DE MAN, l.c. p. 42, Pl. X, figs. 18—18*e*).

w_2 Fingers of smaller cheliped of the usual form, not broadened, unarmed.

x_1 External maxillipeds operculiform, ischium, merus and propodus very broad, the propodus broader than long.

Carpus in both legs of 1st pair longer than palm.

Inner uropod narrow, approximately oval, not yet half as broad as long — *Kraussi* Stebb.

(TH. R. R. STEBBING, South African Crustacea, Cape Town 1900, p. 39, Pl. 2 and 3).

x_2 External maxillipeds pediform, very narrow, ischium 4-times as long as broad, merus half as long as the ischium, carpus one-sixth shorter than the ischium, nearly three times

as long as wide, propodus a little more than half as broad as long, one-third shorter than the carpus.

Carpus of the larger cheliped barely half as long as the palm, that of the smaller cheliped longer than the palm.

Inner uropod oval, a little more than half as broad as long . . . *guineensis* de Man

(J. G. DE MAN, l. c. p. 45, Pl. X, figs. 19—19*e*, Pl. XI, figs. 19*f*—19*r*).

s_2 Second joint of antennular peduncle longer than third.

y_1 Upper surface of ischium of the anterior legs quite smooth, without a trace of a ridge, the lower border of this joint armed along its whole length with many microscopical teeth.

z_1 Upper surface of telson bearing a transverse ridge that is not notched in the middle, nor sharp . . . *novae-britanniae* Borr.

(L. A. BORRADAILE, On the Stomatopoda and Macrura brought by Dr. WILLEY from the South Seas, in: A. WILLEY's Zoological Results. Part IV. Cambridge University Press, Sept. 1899, p. 419, figs. 14*a*—14*d*. — J. G. DE MAN, l. c. p. 48).

z_2 Upper surface of telson without the slightest trace of a transverse ridge *novae-britanniae* Borr. var.

(J. G. DE MAN, l. c. p. 49, Pl. XII, fig. 20—20*g*).

y_2 Ischium of anterior legs with a faint longitudinal ridge on the outer surface and only one or two small, though not microscopical, teeth at the distal end of the lower border. The telson bears on its anterior half a sharp, transverse ridge, notched in the middle, the ends not reaching to the lateral margins . *aequimana* Baker

(W. H. BAKER, Notes on South Australian Decapod Crustacea. Part V., Adelaide 1907, p. 182, Pl. XXIV, figs. 1—8 (Transact. Royal Soc. South Australia, Vol. XXXI, 1907).

a_2 Rostrum terminating into 3—5 spines. . . . . *Turnerana* A. White

(A. WHITE, in: Proc. Zoolog. Soc. London 1861, p. 42, tab. VI. — J. G. DE MAN, l. c. p. 51, Pl. XII, figs. 21—21*f*).

The following species of which I was unable to examine the type specimens, could not be inserted into the key, because the existing descriptions are insufficient.

Call. Bocourti A. M.-Edw. (Nouv. Archives du Muséum, Mémoires T. VI. Paris 1870, p. 95). Of this species which was found "sur les côtes de l'Océan Pacifique, à la Union" and which was referred by BORRADAILE to the subgenus *Callichirus*, the legs of the 1st pair are unknown. Rostrum very sharp, reaching beyond the corneae of the eyestalks, no lateral teeth. Eyestalks flattened, very short, corneae situated at their base near the frontal border. Third joint of antennular peduncle very long, much longer than the flagella. External maxillipeds pediform, but a little more broadened than those of *Call. armata*. Telson broader than long, very short, trilobate posteriorly. Inner uropods very small, rather thick, outer uropods little developed, though reaching beyond the former. Length 100 mm.

Call. brachyophthalma A. M.-Edw. (Nouv. Archives du Muséum. Mémoires T. VI. Paris 1870, p. 85). This species that inhabits the shores of the Chiloé Islands, should, according to Dr. BORRADAILE, be referred to the subgenus *Trypaea*. Rostrum triangular, larger than in *Call. gigas* and *Call. californiensis*; gastric region very convex anteriorly. Eyestalks short, very broad until to their tips. Eyes large. Joints of the antennular peduncle small, those of the antennal peduncle slender and rather long. External maxillipeds operculiform. Larger cheliped unknown. Carpus of smaller cheliped distinctly longer than the chela. Caudal fan much developed, telson as long as the uropods; raised anterior part of the outer uropod much shorter than the other.

Call. brevicaudata A. M.-Edw. (Nouv. Archives du Muséum. Mémoires T. VI. Paris 1870, p. 91, Pl. II, figs. 2, 2^a, 2^b). This species that occurs on the coast of Zanzibar, apparently belongs to the subgenus *Callichirus*. Rostrum triangular, flattened, reaching to the middle of the eyestalks. No lateral frontal spines. External maxillipeds pediform. Anterior legs unknown. Telson almost twice as broad as long, posterior border nearly straight. Uropods as in *Call. armata*. Length of body 40 mm.

Call. celebica de Haan (Fauna Japonica, Crustacea, Tab. N). Of this species only figures of the mouth-parts are known.

Call. occidentalis Bate (Report Challenger Macrura, 1888, p. 29, Pl. II, fig. 2*k*). Of this species only the larger cheliped is known, which was captured by the Challenger Expedition off Sombrero Island, West-Indies, at a depth of 450 fathoms. Carpus twice as long as broad, a little longer than the merus, slightly shorter than the chela, fingers a little shorter than the palm.

Call. petalura Stimps. (Proc. Acad. Nat. Sciences of Philadelphia, 1860, p. 23). Concerning this species, which was taken in the harbour of Simoda, Japan, Professor BALSS, in: Archiv für Naturgeschichte. 90. Jahrg. 1924, p. 52, remarks: „Die Artzugehörigkeit von *Call. petalura* Stimpson bleibt unsicher".

1. *Callianassa* (*Calliactites*) sp. Pl. X, Figs. 15—15*c*.

Stat. 86. June 18/19. Anchorage off Dongala, Palos-bay, Celebes. 36 m. Bottom fine, grey mud (river mud). One specimen.

This specimen, no doubt a young individual, is 5,64 mm. long; carapace, rostrum included, 1,44 mm., abdomen 4,2 mm. long, the carapace measuring about one-third the length of the abdomen. Rostrum not spiniform, but triangular, acute, with nearly straight lateral margins and short, reaching only to the second third part of the eyeplates. *Lineae thalassinicae* distinct. Cervical groove deep, its distance from the posterior margin of the carapace one-fifth the length of the latter.

First segment of abdomen 0,5 mm. long, trapeziform, anterior margin a little convex, 0,32 mm. broad, posterior 0,6 mm.; the lateral margins of this segment, that is a little shorter than broad posteriorly and anteriorly half as broad, are slightly concave. Second segment longer than the others, 0,68 mm. long, 0,72 mm. broad posteriorly, a little less broad anteriorly; third segment 0,52 mm. long, fourth 0,5 mm., fifth 0,6 mm., sixth (Fig. 15) 0,68 mm. long; the sixth is 0,63 mm. broad, little longer than broad. The third segment is a little broader than the second, but the following are less broad. Telson trapeziform, 0,5 mm. long, 0,52 mm. broad, presenting its greatest width at one-third its length from the anterior border; it is shorter than the sixth segment, the lengths being in proportion as 5:7, and barely broader than long. The lateral margins converge slightly backwards and pass with a regular curve into the posterior margin which is 0,34 mm. broad, when it is delimited by the outer of the two small spinules on each side (Fig. 15*a*); these spinules are 0,02 mm. long, of equal length, and as far distant from one another as they are long. The posterior margin that presents a very shallow notch in the middle, is fringed with plumose hairs and bears at each side some longer setae, the longest of which are 0,36 mm. long. The upper surface carries the usual transverse row of hairs anteriorly and a few hairs are observed near the lateral margins. Caudal swimmerets longer than telson. The inner uropod is oval, 0,7 mm. long, 0,36 mm. broad in the middle, a little more than half as broad as long, rounded posteriorly and with arcuate anterior and posterior borders; it is fringed with long plumose setae, that measure 0,3 mm. and some longer, plain hairs are inserted at the apex. The outer uropod is also oval; it is 0,66 mm. long, 0,42 mm. broad in the middle, once and a half as long as broad, rounded apically and with the posterior border more strongly arcuate than the anterior. It is fringed with ciliated hairs, the rounded distal border with stouter and longer, also plumose setae, which are, however, unjointed and of which the longest are 1 mm. long, on the inner part of the apical border, finally, with stout slender spines that are slightly curved forward and of which the longest innermost ones are 0,7 mm. long. The additional row of spines on the upper surface is very short, but diverges distinctly from the apical border, the spines are stout, moderately long, the longest measuring 0,12 mm.

Abdominal appendages of 1st and 2nd segment wanting, perhaps lost. Those of the three following foliaceous, stylamblys short, 0,3 mm. long and about half as thick at base, twice as far distant from the base of the endopodite as it is long.

Eyestalks large, reaching to the middle of the 2nd joint of the antennular peduncle,

0,34 mm. long, 0,225 mm. broad at their base, inner margins nearly contiguous, outer borders arcuate; eyes very black, placed on the distal extremity of the plates, on their outer side,

Internal antennae 1,06 mm. long, shorter than the carapace; antennular peduncle 0,6 mm. long, a little longer than the flagella (0,46 mm.). Second joint of the antennular peduncle 0,1 mm. long, a little shorter than 1st; 3rd joint 0,32 mm. long, 3-times as long as 2nd; looked at from above the 3rd joint proves to be 0,09 mm. thick along its whole length, 3-times as long as thick, in a lateral view, however, the 3rd joint slightly broadens distally. The thicker upper flagellum, barely shorter than the other, is 0,075 mm. broad at its base and somewhat longer than the 3rd joint of the peduncle; it is composed of 8 segments, that are as broad as or broader than long; the lower is much thinner and composed of 7 segments, that are longer than thick.

Antennal peduncle a little longer than that of the inner antennae; 2nd joint 0,3 mm. long, 5-times as long as thick, slightly curved; 3rd joint 0,22 mm. long; the flagellum, which has lost some segments, is 2,4 mm. long, as far as present.

External maxillipeds (Fig. 15*b*) large, operculiform, the ischium and the merus being considerably broadened. The quadrangular ischium proves to be 0,32 mm. long, when measured in the middle; this joint, the outer border of which is straight, the inner arcuate with rounded postero-internal angle, broadens anteriorly, appearing 0,43 mm. broad along the straight anterior margin that articulates with the merus. The merus is 0,34 mm. long and in the middle 0,48 mm. broad; of this joint, which is therefore considerably broader than the ischium, the outer and the somewhat longer, inner borders are convex, arcuate, the antero-internal angle is rounded and the anterior border is emarginate for the insertion of the carpus. The following joints are of subequal length and comparatively broad. The carpus is thick, 0,21 mm. long, 0,14 mm. broad distally, only once and a half as long as thick; propodus 0,22 mm. long, 0,17 mm. broad in the middle, 0,14 mm. at the distal, 0,1 mm. at the proximal end; terminal joint 0,17 mm. long, 0,11 mm. broad in the middle, rounded at the tip, that is thickly covered with stout, plumose setae, 0,1 mm. long. Inner border of ischium and merus bearing a few ciliated hairs that are 0,18—0,2 mm. long. Inner surface of ischium hairy, with a longitudinal row of 12 acute teeth of equal size, that extends, not far from the outer margin, from the anterior border to near the postero-external angle of this joint; the distance between the anterior tooth and the antero-external angle is almost one-third the width of the anterior border. Inner surface of the merus with a longitudinal row of distantly placed hairs, running from the carpal articulation backward.

The two first pairs of legs are wanting.

Merus of 3rd legs (Fig. 15*c*) 0,52 mm. long, 0,22 mm. broad, a little more than twice as long as broad, upper and lower border slightly convex; carpus 0,38 mm. long, just half as thick distally. Propodus oval, 0,38 mm. long, presenting its greatest width of 0,215 mm. at one-third its length from the carpal articulation and narrowing towards the distal end, which is 0,08 mm. broad; of this joint, which is almost twice as long as broad, the posterior border is not prolonged proximally into a lobe, so that this species must indeed be referred to the subgenus *Calliactites*. The lower border which is beset with some distantly placed setae, the longest of which are as long as the joint is broad, is armed with a strong,

movable spine, 0,08 mm. long, as far distant from the distal extremity as it is long. Dactylus 0,16 mm. long.

Merus of 4th legs 0,62 mm. long, 0,205 mm. broad in the middle, 3-times as long as broad; carpus 0,44 mm. long, 0,15 mm. broad. Penultimate joint 0,45 mm. long, 0,15 mm. broad at one-fourth its length from the carpal articulation, slightly narrowing distally, being 0,08 mm. broad as the distal end; the distal extremity of the lower border carries a movable strong spine, 0,14 mm. long and the lower margin is fringed with hairs that are nearly as long or shorter than that spine; the lateral margins are nearly straight. Dactylus rather slender, 0,25 mm. long, 0,06 mm. broad at its base and terminating in a small curved claw.

Merus of 5th legs 0,53 mm. long, 0,12 mm. thick, 4-times as long as thick; carpus 0,42 mm. long, 0,16 mm. thick distally. Propodus rather short and stout, until the end of the fixed finger 0,45 mm. long, 0,19 mm. broad not far from the articulation of the dactylus, and narrowing towards that of the carpus; upper border rather strongly curved, lower concave, the chela, as usually, immersed in a brush of hair.

I do not succeed in identifying this species with any other one of this subgenus. A specific name is not given, because this specimen is probably very young and because the chelipeds are wanting.

2. *Callianassa* (*Calliactites*) *modesta* de Man. Pl. X, Figs. 16—16*b*; Pl. XI, Figs. 16*c*—16*e*.

Callianassa (*Calliactites*) *modesta* J. G. de Man, in: Tijdschr. der Ned. Dierk. Vereeniging (2), Dl. IX, 1905, p. 604.

Stat. 47. April 8/12. Bay of Bima, near South fort. 55 m. Bottom mud with patches of fine coral sand. One egg-laden female.

Stat. 116. July 12. Lat. 0° 58′.5 N., long. 122° 42′.5 E. West of Kwandang-bay-entrance. 72 m. Bottom: fine sand with mud. Five specimens, two of which are egg-laden females.

Stat. 254. Dec. 10. Lat. 5° 40′ S., long. 132° 26′.5 E. 310 m. Bottom: fine grey mud. One mutilated male.

Stat. 261. Dec. 16/18. Elat, West Coast ot Great-Kei-Island. 27 m. Bottom: mud. Five specimens, three of which with eggs.

The largest specimens of this small-sized species are the egg-bearing females, one of them, that from Stat. 261, shall therefore be described. Measured in the middle line, this female is 13,4 mm. long from tip of rostrum to end of telson, the carapace until its concave posterior border measuring 3,6 mm., the abdomen 9,8 mm.; without the rostrum the carapace measures just one-third the length of the abdomen. The pointed spiniform rostrum reaches until the distal end of the 1st joint of the antennular peduncle; anteriorly the carapace slopes obliquely down to the rostrum, so that the latter is situated much beneath the upper surface of the gastric region, as is distinctly visible in a lateral view. In a lateral view the rostrum appears narrow, spiniform, projecting horizontally forward or curved slightly upward. No antennal tooth on the carapace. Lineae thalassinicae distinct. Gastric region ovate, bounded by the rather deep cervical groove; the distance (0,7 mm.) between this groove and the concave, posterior border of the carapace is just one-fifth the length of the carapace. The latter is rounded above, smooth, a little punctate, very finely, especially on the lateral regions.

The abdomen narrows slightly from the anterior border of the 2nd segment to the

posterior of the 6th. The 1st segment, a little shorter than the 2nd, is strongly narrowed in the middle. The 2nd and the 6th are nearly of the same length, they are longer than the others. The 2nd segment is very little broader than long, the 3rd is shorter than the 2nd, the 4th a little shorter than the 3rd, the 5th segment is slightly longer than the 4th and as long as the 3rd. The 6th segment (Fig. 16) is a little longer than broad and narrows somewhat backward; this segment, not only strongly convex transversely but also distinctly convex longitudinally, bears at its rounded, postero-lateral angles a tuft of setae, the longest of which are almost as long as the inner uropods; between these hairs and the middle line the posterior margin carries another tuft of long setae.

In this specimen the telson was broken off, in another of about the same size, long 13,7 mm., from Stat. 116 it shows the following characters (Fig. 16). The telson is considerably smaller than the 6th segment, its length being only three-fifths that of the latter, viz., 1,2 mm., i. e. one-third the length of the carapace; at one-third its length from the anterior border it shows its greatest width of 1,1 mm. In another specimen, from Stat. 261, the telson is 1,1 mm. long, exclusive of the median tooth that measures 0,1 mm., and 1 mm. broad; in a third specimen, from the same locality, the telson is 1 mm. long, without the median tooth, and 0,92 mm. broad. The telson proves thus to be a little longer than broad. The lateral borders at first converge very slightly and then curve regularly into the posterior border which is rounded and which bears in the middle a sharp immovable tooth or spine, already spoken of. Two other smaller, though movable spines are inserted on the lateral margins just there where they curve into the posterior; these spines are of equal size and length and twice as far distant from one another as they are long. The posterior border is fringed with ciliated setae and there are just behind the posterior movable spinule some longer, simple hairs. At the level of the greatest width one observes, on the middle of the upper surface, a transverse row of 10 or 12 setae, the longest, in the middle, extend to the posterior border; a few shorter hairs are inserted between this median row and the lateral margins.

The uropods are considerably longer than the telson, especially the outer uropod; the inner uropod carries, as in other species, one, the outer two longitudinal ribs down the middle. The inner plates are oval, twice as long as broad, and narrow somewhat towards the obtuse distal extremity. The outer uropods, once and a half as long as the inner, are pyriform, regularly curved distally, narrowed proximally; at their greatest width they appear just half as broad as long. Both the inner and the outer uropods are fringed, along their whole border, with ciliated hairs; one observes, near the distal end of the posterior border of the outer uropod, 10 or 12 slender spines which at their tips are a little curved forward and gradually become shorter towards the distal end of the plate. The extremity of the inner uropod carries 4 or 5 similar, somewhat shorter spines, that are slightly curved backward or inward, also 2 or 3 not far from them near the posterior border; between these spines the inner uropod bears a few long simple hairs. A few shorter spines or bristles are inserted near the anterior border of the inner plate. Similar spines are described, in the Report on the Challenger Macrura, on the uropods of *Cheramus orientalis* (p. 31, Pl. I, fig. 2*v*); they exist also in other species, collected by this Expedition.

The additional row of spines at the distal end of the anterior margin of the outer

uropod is extremely short and can easily be overlooked; it diverges barely from the apical border.

The abdomen is smooth, not carinate.

The 1st pair of pleopods of the female are fine uniramous filaments, with outstanding setae; those of the 2nd pair are just as slender, but biramous. The pleopods of the three following segments are biramous, foliaceous. In an adult, egg-bearing female from Stat. 261 the stylamblys is 0,24 mm. long, 0,06 mm. broad at its base and it tapers somewhat towards the distal end that is furnished with cincinnuli; the endopodite is 1,42 mm. long and the stylamblys is twice as far distant from the base of this plate as it is long. The pleopods of the 1st segment of the male from Stat. 254 are short, two-jointed, uniramous filaments; the basal joint is claviform, 0,45 mm. long, 0,06 mm. broad at its base, but, gradually thickening, it is 0,1 mm. broad at the distal end; the terminal joint is much smaller, 0,12 mm. long, oval, 0,055 mm. broad. The pleopods of the 2nd segment are larger and consist of a stalk that bears two slender filaments; the stalk, angularly bent in the middle, is 0,7 mm. long, its anterior border concave, the posterior angular; of the two filaments that narrow a little from the base to the tip, the posterior is 0,52 mm. long, 0,08 mm. broad in the middle, 6-times as long as broad, the anterior is a trifle shorter, 0,44 mm. long, 0,03 mm. broad in the middle, 14 to 15-times as long as broad, presenting a more slender form than the other.

The eggs are not numerous, 25—30 in nnmber; they are 0,5—0,54 mm. long, 0,42—0,46 mm. broad and rounded at both extremities.

The eyeplates that reach almost as far forward as the 1st joint of the antennular peduncle, are of the usual shape, triangular, the inner margins contiguous, the tip more or less sharp; the rather convex cornea is situated in the middle. The eye consists of a fleck of black pigment which is notched posteriorly and appearing therefore more or less double; the black pigment is surrounded externally by another of an ochraceous colour.

The inner antennae of the female, long 13,4 mm., are 2,9 mm. long, a little shorter than the carapace. The 2nd joint of their peduncle, the shortest of all, is 0,26 mm. long and 0,17 mm. thick anteriorly; the 3rd joint, 0,68 mm. long and 0,12 mm. thick in the middle, is almost 3-times as long as the 2nd and 6-times as long as thick. The upper flagellum, 1,58 mm. long, is a little longer than the peduncle and composed of 18 segments; these segments are partly a little broader than long, some are as long as broad, those of the distal half are longer than thick and the terminal segment, that is 0,11 mm. long and 0,02 mm. thick, is slenderer than the preceding, being 5-times as long as thick. The 12 segments of the lower flagellum are, except two or three at the base, slender, much longer than thick; the upper flagellum has therefore a stouter shape than the other and is also a little longer.

The outer antennae are 10,25 mm. long, almost 3-times as long as the carapace; the peduncle is 2 mm. long, the flagellum 8,25 mm. The slender, penultimate joint of the peduncle reaches about as far forward as the peduncle of the inner antennae; this penultimate joint is 0,94 mm. long and 0,12 mm. thick in the middle, 8-times as long as thick. This joint, somewhat slenderer than the 3rd joint of the antennular peduncle, is almost twice as long as the terminal joint, which is 0,5 mm. long; the terminal joint thickens somewhat towards the distal end. The antepenultimate joint carries, at the distal end of its upper surface, a small spine, which is

thickened at its base and the pointed tip of which is curved inward; this spine, 0,14 mm. long and probably movable, represents the "scaphocerite". Boas, in: Studier over Decapodernes Slaegtskabsforhold, 1880, p. 85, has already demonstrated the existence of a rudimentary scaphocerite in this genus, but, according to Alcock, the genus *Callianassa* should bear no antennal scale (A. Alcock, A descriptive Catalogue of the Indian Deep Sea Crustacea etc., Calcutta 1901, p. 198). The lash-like, somewhat hairy flagellum is composed of 60 segments; the first five or six are short, nearly as broad as long, the following are longer than broad, the penultimate segment 6-times as long as thick.

Ischium and merus of the external maxillipeds (Fig. 16*a*) are rather narrow. The inner border of the basipodite ends anteriorly in a sharp spine. The ischium, 0,8 mm. long and 0,4 mm. broad, is just twice as long as broad; its outer border is slightly concave, the inner a little convex and fringed with simple hairs which are longer than the ischium is broad. Merus rhomboid, the slightly convex outer border 0,52 mm. long, the inner, also slightly convex, 0,46 mm. long; the hind border that articulates with the ischium, is 0,32 mm. broad, the anterior border 0,42 mm. This joint appears therefore broader anteriorly than posteriorly; the anterior margin is armed with a small tooth or spine at one-fourth its length from the rounded, inner angle and the inner edge carries the same hairs as the preceding joint. The pyriform carpus is 0,46 mm. long, measured along its arcuate, outer border; it is 0,12 mm. thick at its base and 0,24 mm. at its distal end, being here twice as broad or thick as at the articulation with the merus. The penultimate joint, 0,48 mm. long, is 0,14 mm. broad proximally, 0,27 mm. just behind the middle and 0,12 mm. at the distal extremity; the propodus is thus a little more than half as broad as long. The finger-shaped dactylus, finally, is 0,36 mm. long and 0,12 mm. broad, presenting its greatest width somewhat nearer to the articulation than to the tip; the dactylus is thus 3-times as long as thick. The three last joints are fringed, both on their outer and inner borders, with setae similar to those of ischium and merus; they are closer-set on the inner than on the outer border. The inner surface of the ischium is armed, as usually, with a prominent comb of minute sharp teeth, that runs from the antero-external angle of the preceding joint to the middle of the distal border of the ischium; it is situated on the outer half of the inner surface. The teeth are 28 or 30 in number; they are closer-set on the distal half of the comb than on the proximal and on the distal half 5 or 6 larger teeth alternate with 2 or 3 smaller ones; proximally the comb is a little curved inward. The merus bears a series of long simple setae on the middle of its inner surface, running from the articulation with the carpus to the postero-internal angle of this joint.

The larger cheliped (Fig. 16*b*), placed either at the right or at the left side, resembles that of *Call. pachydactyla* A. M.-Edw. (Nouv. Archives du Muséum, Mémoires, T. VI, Pl. II, fig. 1*d*), but differs especially by the armature of ischium and merus. This leg, nearly 8 mm. long, is a little more than twice as long as the carapace. The ischium, 1,5 mm. long, is 0,37 mm. broad at its base and in the middle, being 4-times as long as broad; the straight, lower margin of this joint, that slightly widens at the distal end, being here 0,5 mm. broad, is armed along its whole length with 7 slender, acuminate spines, that gradually grow longer from the proximal to the distal one, the foremost being 0,2 mm. long, and they are slightly curved forward; the upper margin is a little concave as in *Call. pachydactyla*, but unarmed.

Merus oval, 1,64 mm. long and 1,05 mm. broad in the middle, so that it appears once and a half as long as broad. The upper border is strongly and regularly curved, the lower armed just in the middle with a small, tiny, though slender spine, only 0,12 mm. long and slightly bent forward; the merus is broadest in the middle. The lower border of this joint, that is very little longer than the ischium, carries a few short hairs, that are shorter than the spine. The carpus is 1,12 mm. long, measured along its nearly straight upper border, and 1,47 mm. wide or high at the articulation with the hand; the carpus is thus a little broader or deeper than long and its hind border is regularly curved from the meral articulation to the rather sharp, distal extremity. Measured along its lower border, the chela proves to be 3,6 mm. long and it is 1,7 mm. high or broad in the middle of the palm; near the carpal articulation, however, the palm, that is about once and a half as long as the carpus, appears not broader than the latter. The fingers, the tips of which cross one another, when closed, are nearly as long as the palm, the upper border of the dactylus being 1,7 mm. long, just as long as the palm is broad. The fixed finger bears a conical, larger, obtuse tooth just behind the middle, i. e. a little nearer to the articulation than to the tip; it is followed by three much smaller teeth of equal size and these by four or five still smaller prominences of the cutting-edge, all obtuse. The dactylus bears near the base a long, depressed tubercle and, just beyond the middle, a conical tooth, which is a trifle smaller than the large tooth of the immovable finger; between both are two very low and rounded teeth and the rest of the finger beyond the conical tooth is somewhat uneven. Merus, carpus and chela are carinate on their upper border, the carpus and the chela also on their lower; the upper border of the dactylus is carinate and each finger presents a longitudinal carina on its outer surface. The joints of this leg are smooth, punctate and the fingers are a little hairy.

The smaller cheliped (Fig. 16*c*) differs chiefly by the shape and characters of carpus and chela. The ischium, 1,4 mm. long and 0,38 mm. broad in the middle, widens more regularly towards the distal end; the upper and the lower border are straight and the lower is armed, as in the other leg, with 7 acute spines, that gradually become longer towards the distal end of the joint. The merus, 1,5 mm. long and 0,82 mm. broad in the middle, fully resembles that of the other cheliped, but the tiny spinule, 0,12 mm. long, is not exactly placed in the middle, but a little beyond the middle of the lower border. The carpus, 1,34 mm. long, presents its greatest width of 1 mm. a little beyond the middle: the carpus is thus one-third longer than broad or high. The upper border is slightly curved and the lower is also regularly arcuate from the meral articulation to its obtuse, distal extremity; near the articulation with the chela the carpus is 0,84 mm. high. The chela is 3 mm. long, the palm 0,85 mm. long and 0,98 mm. broad or high, the palm is thus a trifle broader than long and the straight, slender fingers are $2^1/_2$-times as long as the palm. They leave a narrow interspace between them when closed and taper regularly to the pointed tips that cross one another; the fixed finger (Fig. 16*d*) carries 15 or 16 low, very small teeth along its whole length, similar teeth stand on the other finger, they are here still smaller, barely perceptible. The fingers are furnished with long, fine, ciliated hairs, some setae are also placed near the margins of the palm and of the preceding joints. In a smaller ova-bearing female from the same Station the carpus of the smaller cheliped has a different form. This joint, indeed, 1,24 mm. long, measured along its

straight upper border, presents its greatest width of 0,53 mm. near the articulation with the chela; the carpus, more than twice as long as broad, has a more slender form than in the type. In another specimen, 11 mm long, from the same Station, the smaller cheliped agrees, as regards the shape of its joints, with the type, but it appears much stouter. The carpus is 1,48 mm. long and 1,14 mm. broad; the chela is 3,5 mm. long, the palm 0,8 mm. long and 1 mm. high. The fingers are 3-times as long as the palm and leave a wider interspace between them; the 17 or 18 teeth of each finger are more distinct, sharper and the dactylus is a little more curved than in the first described female.

The 2nd legs resemble closely those of *Call. rotundicaudata* (Stebbing, South African Crustacea, Pt. II, 1902, Pl. VIII, prp. 2), but the palm appears a little broader or wider than the carpus; the long setae, with which the margins are fringed, are less distinctly ciliated than in the quoted figure. In the typical female, long 13,4 mm., the merus is 1,7 mm. long, 0,43 mm. broad in the middle and 0,27 mm. broad at the distal end; the carpus is 0,84 mm. long and 0,46 mm. broad distally. The chela is 1,2 mm. long, the palm 0,3 mm. long and 0,52 mm. broad, the fingers 3-times as long as the palm.

The merus of the 3rd legs (Fig. 16*e*) is slender, 1,4 mm. long, 0,32 mm. broad in the middle, a little more than 4-times as long as broad; the carpus, 0,9 mm. long, thickens gradually towards the distal extremity, being here 0,32 mm. broad, just as broad as the merus. Very characteristic is the shape of the propodus, that presents the characters of the subgenus *Calliactites* Borr. The propodus has an elongate, laminar form, being 0,82 mm. long, 0,3 mm. broad in the middle, 0,22 mm. at the proximal and 0,18 mm. at the distal extremity; the upper and the lower border of this joint, that appears almost 3-times as long as broad, are nearly straight, the lower border without any trace of a backward produced lobe. The propodus appears even at its proximal extremity a little less broad than in the middle. The terminal joint, 0,46 mm. long and 0,15 mm. broad, 3-times as long as broad and a little more than half as long as the propodus, ends in a short acute claw; the upper border of the dactylus is more strongly arcuate than the lower. The dactylus is fringed with long hairs, that occur also on the lower border of the propodus and at the distal extremity of the lower border of the carpus. The 4th legs differ from the 3rd only by the joints being somewhat slenderer. The merus that slightly narrows distally, is 1,45 mm. long and 0,25 mm. broad in the middle, 6-times as long as broad; the carpus, which is 1,04 mm. long, thickens towards the distal extremity and is here 0,24 mm. broad, this joint being 4-times as long as thick. The propodus, exactly as long as the carpus, is 5-times as long as broad and its margins are straight and parallel; the lower is fringed with long setae, that are very closely set near the distal extremity. The dactylus, 0,4 mm. long and 0,12 mm. broad, is straight and ends in a short claw, long 0,04 mm.; it is, as in the 3rd legs, clothed with long hairs. The sternal plaque is bifurcate anteriorly, bilobed posteriorly.

The 5th legs are subchelate. The merus, 1,28 mm. long and 0,17 mm. broad in the middle, almost 8-times as long as broad, is somewhat slenderer than the 4th legs. The carpus, 0,94 mm. long, thickens regularly towards the distal extremity, which is 0,22 mm. broad. The propodus, measured to the end of the fixed finger, is 1,1 mm. long; this joint, which is slightly curved and 0,18 mm. broad at its base, widens a little distally, the joint being here

0,23 mm. thick. The immovable finger, little shorter than the other, is almost as long as the propodus is broad at the level of the articulation of the dactylus; the curved dactylus, 0,3 mm. long, is rather thick at its base, being here 0,13 mm. broad and tapers to the pointed extremity. The distal half of the propodus and the dactylus, except the upper margin of the former, are immersed in long, ciliated setae.

The egg-bearing female from Stat. 47 is 10,5 mm. long; it agrees with the type, the ischium of the larger cheliped carries, however, only five spines, the merus is only half as broad as long and the spine at the lower margin is rudimentary: all differences due to the younger age of this specimen.

3. *Callianassa* (? *Cheramus*) *Sibogae* de Man. Pl. XI, fig. 17—17*e*.

Callianassa Sibogae J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Deel IX, 1905, p. 613.

Stat. 5. March 10. Lat. 7° 46′ S., long. 114° 30′.5 E. 330 m. Bottom mud. One specimen.

This specimen is unfortunately much damaged, the 1st, 3rd and 4th pair of thoracic legs are wanting. It is therefore impossible to say with certainty to which subgenus it ought to be referred, to *Calliactites* or to another one.

Carapace, rostrum included, 6,8 mm. long, abdomen 16 mm., whole length 22,8 mm.; carapace comparatively large, little shorter than half the length of the abdomen, as in *Call.* (*Calliactites*) *caecigena* Alcock and Anderson. *Lineae thalassinicae* distinct. Cervical groove laterally rather indistinct, its distance from the posterior margin 1,44 mm., one-fifth the whole length of the carapace. The rostrum (Figs. 17, 17*a*, 17*b*), as long as 1st joint of antennular peduncle, is spiniform, acuminate, laterally strongly compressed, appearing therefore lamellar, with sharp upper edge. No antennal tooth on carapace. The carina of the rostrum is not prolonged on to the carapace, so that the upper surface of the latter is smooth, not carinate; the branchial regions appear minutely granular under a strong lens. Behind the cervical groove the carapace is somewhat raised in the middle line, forming, however, no tubercle as in *Call. caecigena*.

First segment of abdomen saddle-shaped, 1,7 mm. long, 2,16 mm. broad posteriorly, less broad anteriorly, strongly narrowed in the middle; its anterior border is arcuate, its lateral margins concave. The broader posterior part is carinate in the middle line presenting here a low, somewhat compressed tubercle and on each side of it there is a small granule; the obtuse postero-lateral angles of the posterior part project laterally outward. The second segment, 2,4 mm. long and 3,5 mm. broad, nearly once and a half as long as the first, is almost one and a half times as broad as long and considerably broader than the first; the second segment, broader posteriorly than anteriorly, has sharp lateral margins that are somewhat prominent laterally. The third segment, 2,12 mm. long and 3,8 mm. broad, is but little shorter than the second, but appears slightly broader. The fourth, 1,9 mm. long and 3,6 mm. broad, is a little shorter and less broad than the third and almost twice as broad as long; the fifth segment, 2,3 mm. long and 3,4 mm. broad, is almost as long as the second, a little longer than the third and less broad than the fourth. The sixth segment (Fig. 17*c*), 3,1 mm. long and 2,8 mm. broad, is the longest of all, being even one-

fourth longer than the second; this segment, the parallel lateral margins of which are, as usually, notched not far from the posterior border, is a little longer than broad. The antero- and postero-lateral angles of the 2nd to 6th segments are rounded or obtuse, their terga smooth, not carinate.

The telson, 2,5 mm. long, 2,2 mm. broad anteriorly, only one-sixth shorter than the penultimate segment, is a little longer than broad; the lateral margins converge slightly backwards towards the posterior margin that appears a little concave in the middle (Fig. 17*d*) and on each side of it. The telson is fringed with the usual plumose, articulated hairs and on either side of the middle the posterior margin carries a few longer, simple hairs, that are 1,5 mm. long; it carries probably also a few short bristles. At one-third of its length from the anterior border the upper surface bears the usual transverse row of long, non-ciliated setae, that reach to the posterior border and on each side of it near the lateral borders 2 or 3 smaller hairs.

Basal joint of uropods rounded anteriorly and posteriorly, unarmed. Uropods foliaceous, considerably longer than telson, when extended backward. Inner uropod 3,3 mm. long, 1,6 mm. broad in the middle, just half as broad as long, with obtuse, rounded apex; anterior border straight proximally, posterior arcuate; it is fringed, as usual, with plumose articulated hairs, which at the apex are 1,9 mm. long; like in other species the apex bears moreover long plain setae that are 2,3 mm. long and at the outer side of it 3 or 4 stiff bristles, the longest of which is 0,5 mm. long, and that are slightly curved inward. The outer uropod, 3,9 mm. long, longer than the inner, is 2,05 mm. broad in the middle, being here a little more than half as broad as long; the anterior border is curved and makes an obtuse, moderately distinct angle with the distal or apical border that is broadly rounded and that regularly curves into the inner margin which proximally is straight. The outer uropod is fringed with as long plumose and articulated hairs as the inner, at the rounded apical border with the usual stiff, plumose setae that are unjointed and the longest of which measure 2,2 mm. and on its inner half with long, slender spines that are slightly curved forward and the longest innermost of which are 1,4 mm. long. The additional row of bristles on the antero-external angle of the outer uropod is rudimentary, very short, only 0,4 mm. long and diverges but little from the distal border; it is composed of 8 or 9 short bristles. One observes a small tuft of 4 or 5 setae on the upper surface of the outer uropod near the middle of the anterior border and a few short hairs are dispersed on the surface.

Pleopods of 1st segment slender, uniramous, those of the 2nd slender, biramous; pleopods of the three following segments foliaceous, long, though rather narrow and the stylamblys which is 0,66 mm. long, 0,17 mm. broad at the base and 0,11 mm. at the tip, is a little shorter than its distance 1,1 mm., from the base of the plate.

Eyestalks as long as 1st joint of antennular peduncle, 0,62 mm. long and a little broader at their base, apex obtuse, outer margin slightly concave anteriorly; they bear on the middle a prominent, semiglobular, tubercle, the cornea, but the pigment is almost unrecognizable.

The 2nd joint of the antennular peduncle (Fig. 17) is 0,42 mm. long and 0,36 mm. thick distally; 3rd joint 1,6 mm. long, 0,23 mm. thick in the middle, 7-times as long as thick, four times as long as 2nd. The upper flagellum, 2,8 mm. long and 0,18 mm. thick in the

middle, is composed of 16 segments, those of the proximal half are as long as or very little longer than thick, those of the distal half once and a half as long as thick, the terminal segment 0,18 mm. long, styliform, 0,04 mm. thick at base. The 7 last segments are furnished with olfactory filaments and, excepting the 3 or 4 first ones, the segments bear on their lower surface tufts of short, plain hairs. The lower flagellum, 2,9 mm. long and 0,08 mm. thick in the middle, slightly longer but only half as thick as the upper, is composed of 15 segments of unequal length, that are all, except the two first ones, much longer than thick and provided below with long setae; the eighth segment, e. g., is 0,26 mm. long and 4-times as long as thick, the three last segments are 0,22 mm. long and also nearly 4-times as long as thick. The internal antennae, 5,54 mm. long, are a little shorter than the carapace and the flagella are slightly longer than the peduncle.

External antennae nearly as long as the abdomen. The terminal or 5th joint of their peduncle extends just beyond the distal end of the peduncle of the inner antennae; the 4th or penultimate joint is 2 mm. long and 0,23 mm. thick in the middle, about 8-times as long as thick; as in all the other species of this collection the 2nd joint carries on its distal end a small, acuminate spine, the scaphocerite. The terminal joint measures two-fifths the penultimate; only one flagellum is still present, 9,4 mm. long, but some last segments are broken off.

External maxillipeds (Fig. 17*e*) subpediform. The two first joints are small, obtuse, unarmed. Measured in the middle the ischium appears to be 1,52 mm. long; the slightly concave, outer margin is 1,54 mm. long, posteriorly this joint is 0,95 mm. broad, anteriorly 0,65 mm., and in the middle 0,8 mm. In the middle the ischium appears half as broad as it is long, it has a quadrangular shape, slightly narrowing anteriorly, with rounded postero-internal angle and nearly straight inner border; the anterior margin that articulates with the merus, runs a little oblique. Measured in the middle, the merus shows a length of 1,1 mm.; the straight outer margin is 1,14 mm. long, the slightly arcuate inner 1,15 mm., the posterior margin that articulates with the ischium, is 0,51 mm. broad and anteriorly the breadth is 0,74 mm. The merus, the length of which measures little more than two-thirds that of the ischium, has also a quadrangular shape; this joint, that is once and a half as long as broad in the middle, widens somewhat anteriorly and its anterior border that runs parallel with the posterior, is a little concave near the obtuse, antero-internal angle. Carpus 0,84 mm. long, 0,45 mm. thick distally; propodus 1 mm. long, 0,47 mm. broad, twice as long as broad, barely broader than the preceding joint; dactylus 0,7 mm. long, 0,22 mm. broad, finger-shaped, obtuse. Inner border of merus and ischium fringed as usual with hairs, that are 1,2 mm. long, the other joints with similar hairs. Like in other species the inner surface of the ischium bears a comb of about 25—30 acute teeth of different size, situated nearer to the outer than to the inner margin and curving inward at its proximal end; the foremost tooth is larger than the others. This comb is continued on the inner surface of the preceding joint and here also the foremost tooth is larger than the rest. Like in other species one observes a row of long hairs on the inner surfaces of the merus and of the following joints.

The 2nd chelipeds are as in the other species, the carpus is 1,8 mm. long and 0,95 mm. broad distally.

The 5th legs are cheliform and present also nothing remarkable. Merus 2,75 mm. long, 0,37 mm. thick in the middle, 7-times as long as thick; carpus 1,9 mm. long, 0,5 mm. thick distally; propodus until the distal end of the fixed finger 2,5 mm. long, 0,4 mm. thick at the proximal extremity and in the middle, 0,52 mm. at the articulation of the dactylus; the latter, 0,7 mm. long, slightly longer than the immobile finger. This leg as usual immersed distally in a brush of hairs.

Callianassa Sibogae may be easily recognized by the lamellar, strongly compressed, acuminate rostrum, the shape of the abdominal terga, of the caudal fan and of the outer maxillipeds.

3. *Callianassa* (*Cheramus*) *propinqua* de Man. Pl. XII, Fig. 18—18*d*.

Callianassa propinqua J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Dl. IX, 1905, p. 609.

Stat. 114. July 8. Kwandang-bay-entrance. Lat. 0° 58'.5 N.; long. 122° 55' E. 75 m. Bottom hard sand, very fine. One female with eggs.

Though closely allied to *Call.* (*Cheramus*) *praedatrix*, this specimen belongs apparently to another species, distinguished by the caudal fan, the less broad ischium of the external maxillipeds, by the internal antennae etc. Unfortunately in this specimen the larger cheliped is wanting and in the single type specimen of *Call. praedatrix* the smaller is broken off. Length of carapace, rostrum included, 3,4 mm., abdomen 9,6 mm., total length 13 mm. Rostrum (Fig. 18) spiniform, narrow, acuminate, reaching a little beyond the middle of 1st joint of antennular peduncle. Carapace as long in proportion to the abdomen as in *Call. praedatrix*; distance (0,8 mm.) between the distinct cervical groove and the posterior border of the carapace also one-fourth its length. *Lineae thalassinicae* distinct.

Except the caudal fan the abdomen resembles that of *Call. praedatrix*. First segment saddle-shaped, 0,92 mm. long. Second and 6th segments respectively 1,9 mm. and 1,84 mm. long, nearly of equal length, distinctly longer than the rest; 6th segment (Fig. 18*a*) 1,48 mm. broad, one-fourth longer than broad. Telson 1,2 mm. long, without the median tooth, two-thirds the length of the 6th segment, and at the level of its greatest width, anteriorly, 0,95 mm. broad; it is one-fourth longer than broad, appearing comparatively a little less broad than the telson of *Call. praedatrix*. Otherwise than in this species the telson is rounded posteriorly; it bears, as in *Call. praedatrix*, in the middle line an acute tooth, 0,09 mm. long and attached to the lower surface. Posteriorly the border of the telson presents in the middle line a very small notch, 0,03 mm. broad, still less broad than the tooth at its base and only perceptible by means of the microscope. At a distance, about 3-times as long as the median tooth, the telson bears at each side a small movable spine, 0,06 mm. long, two-thirds the length of the median tooth; somewhat further forward the lateral borders bear a second movable spine, just as long as the first and the distance between the two spines is two-thirds of the distance between the posterior spine and the median tooth. The telson is fringed with the usual articulated, ciliated hairs, 0,38 mm. long, and between the median tooth and the posterior lateral spinule long plain setae are inserted, of which the longest are 0,9 mm. long. A few short setae are observed on the upper surface near the lateral borders

and anteriorly at the level of the greatest width the upper surface carries in the middle the usual transverse row of setae, the longest of which reach to the end of the telson.

The uropods, directed backward, extend beyond the telson, the outer rather considerably. Basal joint rounded, perhaps with a very small, acute tooth on its posterior border near the base. Inner uropod 1,3 mm. long, presenting its greatest width of 0,7 mm. at the level of the lobe on the anterior border, at one-fourth its length from the base, and hence narrowing to the obtuse apex, the greatest width is thus a little more than half the length of the plate; anterior border as far as the proximal lobe straight, posterior arcuate. On the outer side of the distal extremity 3 or 4 slender spines are inserted, that are slightly curved backward; on the inner side of it and near the posterior margin some plain setae exist, of unequal length, those at the apex being 0,7 mm. long. The upper surface carries, near the proximal lobe on the anterior border, three slender bristles, the middle of which is the longest, 0,2 mm. long. Outer uropod 1,64 mm. long, one-fourth longer than the inner, 0,88 mm. broad, presenting the greatest width not far from the distal border; it has an elongate quadrangular form, becomes distally a little wider and is almost twice as long as broad. The straight anterior border and the slightly arcuate posterior, that run nearly parallel with one another, make right angles with the barely arcuate, distal border and both angles are quite distinct, obtuse, but not rounded; the distal border is 0,76 mm. broad. Both uropods are fringed with the usual plumose and articulated hairs; the distal border of the outer is furnished with the ciliated, though unjointed stiff setae that are 0,96 mm. long at the postero-external angle and that become gradually shorter anteriorly. As in other species slender spines, that are slightly curved forward and that gradually diminish in length, are implanted near the distal end of the posterior border. As regards the additional row of bristles near the antero-external angle of the upper surface this species agrees with *Call. praedatrix*: it is short, measuring only one-third the length of the distal border, from which it barely diverges. Two short bristles are inserted near the anterior border, not far from the distal extremity and near the distal bristle that is slightly longer than the other, one observes a rather short seta.

Pleopods of 1st segment slender, uniramous filaments, those of 2nd still more slender, biramous; pleopods of the three following segments biramous, foliaceous with a short stylamblys that is 0,2 mm. long and 3-times as far distant from the base of the plate as it is long.

The eyestalks (Fig. 18) that are a little longer than the rostrum, reach almost to the distal end of 1st antennular article; their inner margins are contiguous, their tips obtuse and the large spot of black pigment is as far distant from the base as from the tip.

Internal antennae (Fig. 18) 2,45 mm. long, somewhat shorter than the carapace; flagella a little shorter than the distance between the distal extremity of their peduncle and the base of the rostrum. Second joint of the peduncle shorter than 1st, 0,22 mm. long, 0,16 mm. thick distally; 3rd joint 0,54 mm. long, $2^1/_2$-times as long as 2nd and slightly tapering forward. The upper flagellum, 1,16 mm. long and 0,095 mm. thick in the middle, is composed of 14 segments; the 5 or 6 proximal segments are nearly as long as thick, the following are a little longer, so e. g. the eighth segment is 0,12 mm. long and 0,093 mm. thick distally, the tenth also 0,12 mm. long and 0,075 mm. thick. The lower flagellum that has nearly the same length,

is 0,06 mm. thick in the middle, i. e. two-thirds of the other, so that the upper flagellum appears distinctly thicker than the lower; it is composed of 11 segments that are distinctly longer than thick and that are furnished below with the usual long setae.

External antennae 7,3 mm. long, more than twice as long as the carapace. The peduncle is 1,62 mm. long and extends with its terminal joint beyond the peduncle of the inner antennae; as in the other species of this collection a small spinule occurs on the distal end of the antepenultimate joint, above; the 4th joint is 0,66 mm. long and 0,107 mm. thick in the middle, the 5th or terminal joint is 0,46 mm. long, two-thirds the 4th and 0,095 mm. thick. Flagellum 5,68 mm. long, consisting of 50 segments.

The external maxillipeds (Fig. 18*b*) resemble those of *Call. modesta* de Man. Basipodite with a small tooth at the antero-internal angle. Ischium quadrangular; measured in the middle it proves to be 0,78 mm. long and 0,367 mm. broad, twice as long as broad, outer border slightly concave, inner straight, their angles with the posterior margin are rounded. The anterior margin of the ischium, 0,34 mm. broad, runs somewhat oblique, parallel with the posterior. Measured in the middle the merus proves to be 0,4 mm. long without the spine on the anterior margin and 0,45 mm., the spine included. The posterior margin that articulates with the ischium, is 0,31 mm. broad, the greatest width, however, anteriorly is 0,51 mm. The merus is half as long as the ischium, but anteriorly distinctly broader; the slightly convex, outer margin is 0,42 mm. long, much longer than the inner and the anterior border is armed in the middle with a sharp spine, directed inward. The antero-internal angle is rounded and between the spine and the antero-external angle the anterior border is straight. Carpus 0,44 mm. long, half as thick distally; propodus 0,42 mm. long and a little more than half as broad, presenting its greatest width of 0,24 mm. at one-third its length from the carpal articulation. Dactylus 0,3 mm. long, shorter than the two preceding joints, 3-times as long as thick, finger-shaped. As in other species there is a prominent comb of 25 sharp teeth on the inner surface of the ischium, placed nearer to the outer than to the inner border; larger teeth alternate with smaller ones and the comb is prolonged on the basipodite. The following joints carry a row of setae on their inner surface; of the setae on the inner margin of ischium and merus the longest measure 0,52 mm., being considerably longer than the ischium is broad.

The smaller cheliped (Fig. 18*c*) is about 6,5 mm. long, half as long as the body. Measured in the middle, the ischium, combined with the preceding joint, proves to be 1,36 mm. long: it has a slender shape, 0,24 mm. broad in the middle, 5- or 6-times as long as broad and widening a little distally, being 0,38 mm. broad at the distal end; the lower margin is armed with 6 slender spines, that become a little longer distally, the foremost being 0,19 mm. long and 0,04 mm. broad at its base. Merus 1,3 mm. long, as long as the preceding joint, presenting its greatest width of 0,54 mm. just in the middle and narrowing regularly both forward and backward. The merus, $2^1/_2$-times as long as broad, has both its upper and lower margin regularly curved, the upper entire, unarmed, the lower, however, armed just in the middle with a slender spine, that exactly resembles in length and shape the foremost spine of the ischium. The lower border carries also some distantly placed setae of unequal length. Measured along its straight upper border the carpus appears to be 1,4 mm. long, a little longer than the merus, 0,56 mm. broad at the distal extremity and 0,18 mm.

near the meral articulation; the carpus that is quite unarmed, grows regularly broader towards the distal end, being here $2^1/_2$-times as long as broad distally and with the lower border slightly arcuate. The chela is 2,14 mm. long, the palm 0,84 mm., the fingers 1,3 mm.; the slender chela is almost once and a half as long as the carpus, the fingers once and a half as long as the palm. The palm, 0,64 mm. broad near the articulation of the fingers, appears a little longer than broad; the slender fingers taper to the tips, the lower bears 4 or 5 obtuse and low teeth in the middle, but the rest of its cutting-edge like also that of the dactylus, are entire. The lower border of the chela is fringed with rather short setae and the fingers are, as usual, hairy.

Second legs as in the other species; lower border of the merus fringed with setae, which are 1 mm. long, more than twice as long as the joint is broad, Carpus 0,84 mm. long and half as broad distally.

Merus of 3rd legs (Fig. 18*d*), measured along the upper border, 1,24 mm. long and 0,3 mm. broad, 4-times as long as broad. Carpus, measured in the middle, 0,9 mm. long, 0,48 mm. broad distally; upper border straight. The propodus is 0,64 mm. long and 0,39 mm. broad in the middle, being about once and a half as long as broad; the lobe on the hinder edge, 0,14 mm. long, measures one-fourth the whole length and is rather sharp, the proximal part of the lower border being straight. The upper margin is slightly curved, the lower entire, nowhere emarginate, but, as in *Call. praedatrix*, the long setae with which it is fringed, are reddish-brown coloured. Dactylus 0,4 mm. long, 0,16 mm. broad, as in *Call. praedatrix*. Legs of 4th and 5th pair wanting.

5. *Callianassa* (*Cheramus*) *joculatrix* de Man.

Pl. XII, Figs. 19, 19*b*, 19*c*; Pl. XIII, Figs. 19*a*, 19*d*—19*m*.

Callianassa joculatrix J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Deel IX, 1905, p. 610.

Stat. 2. March 8. Madura-strait. Lat. 7° 25′ S., long. 113° 16′ E. 56 m. Bottom: grey mud with some radiolariae. Three males, two females, all rather young.

Stat. 5. March 10. Lat. 7° 46′ S., long. 114° 30′.5 E. 330 m. Bottom: mud. Four females, two of which with eggs.

Stat. 19. March 19/21. Bay of Labuan Tring, west coast of Lombok. Lat. 8° 44′.5 S., long. 116° 2′.5 E. 18—27 m. River-mud, coral, coralsand. One young male and nine females, most are adult and two are provided with eggs.

Stat. 47. March 8/12. Bay of Bima, near South fort. 13—31 m. Bottom: mud with patches of fine coral sand. Three males, two females, not quite adult.

Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Up to 36 m. Bottom: coral sand; near the shore mud. Two young specimens.

Stat. 71. May 10—June 7. Makassar and surroundings. 27—32 m. Bottom: mud, sand with mud. One very damaged young specimen.

Stat. 114. July 8. Kwandang-bay-entrance. Lat. 0° 58′.5 N., long. 122° 55′ E. 75 m. Bottom: hard sand, very fine. One young female.

Stat. 115. July 9/11. East side of Pajunga Island, Kwandang-bay. 31 m. One ova-bearing female.

Stat. 213. Sept. 26—Oct. 26. Saleyer-anchorage and Surroundings, including Pulu Pasi Tanette, near the North point of Saleyer-island. Up to 36 m. Bottom: coralreefs, mud and mud with sand. Six rather young specimens, four males and two females.

Stat. 254. Dec. 10. Lat. 5° 40′ S., long. 132° 26′ E. 310 m. Bottom: fine grey mud. Three specimens, amongst which one egg-bearing female.

Stat. 306. Febr. 8, 1900. Lat. 8° 27′ S., long. 122° 54′.5 E. 247 m. Bottom: sandy mud. Four young specimens.

A species of small size, one of the largest specimens is a female without eggs from Stat. 19. The carapace of this specimen is 4,75 mm. long, rostrum included, the abdomen 13,55 mm., the whole animal 18,3 mm.: the carapace, without the rostrum, measures one-third the length of the abdomen. The carapace has the usual form. The rostrum (Fig. 19) that barely reaches beyond the middle of 1st antennular article, is spiniform, pointed, rather broad at its base and, viewed from above, its lateral margins appear concave; it projects forward almost in the level of the upper surface of the gastric region and is often slightly inclined downward. No antennal tooth on the carapace. One or two long setae are inserted on the anterior border of the carapace at the extremity of the short groove near the outer angle of the eyestalks. *Lineae thalassinicae* distinct. Cervical groove deep, its distance from the concave posterior border of the carapace one-sixth its whole length, rostrum included.

First segment of abdomen trapeziform, 1,8 mm. long, not coalesced with the 2nd, with rounded antero-lateral angles; anteriorly less broad than the distance between the two *lineae thalassinicae*, the 1st segment is much broadened posteriorly, being here almost twice as broad. Second segment 2,5 mm. long, 2,8 mm. broad, longer than the rest, nearly as long as the 3rd and 4th segments taken together; 4th segment distinctly shorter than 3rd, the 5th somewhat longer than the 3rd, the 6th longer than the three preceding segments. The 6th segment (Fig. 19*a*), 2,2 mm. long and 2,4 mm. broad, somewhat broader than long, is less broad than the preceding segments; it shows its greatest breadth anteriorly, the lateral margins slightly converging towards the concave posterior border, not far from which the lateral margins are slightly notched. The upper surface of this segment which appears slightly convex longitudinally, is furrowed in the middle line posteriorly for a very short distance, viz., for one-fifth the length of the segment. The abdomen is smooth, rounded, not carinate.

The abdominal pleura are rudimentary. Those of the 1st segment end in a sharp point in the male, but are obtuse in the female.

The telson, somewhat convex both transversely and longitudinally, is considerably smaller than the 6th segment, the length being two-thirds the length of the latter. The telson is 1,4 mm. long and 1,6 mm. broad anteriorly, distinctly a little broader than long, and presents its greatest width at one-third its length from the anterior margin. Hence the straight lateral margins converge backward, passing with a regular curve into the nearly straight hind border, which is almost as broad as the anterior margin, that articulates with the 6th segment. The posterior border of the telson bears a microscopical acute tooth in the middle, it is fringed with short hairs and between them with short movable spines and it carries, moreover, on each side a tuft of longer plain hairs. A short transverse row of long hairs exists in the middle of the upper surface and one or two shorter hairs are implanted between this row and the lateral margins.

The uropods, directed backward, are considerably longer than the telson, the outer, indeed, extends with more than half its length beyond it. The inner uropod, which is 1,3 mm. long, 0,6 mm. broad at its base and 1,04 mm. posteriorly, becomes broader backward and is broadly rounded; this limb, the nearly straight outer border of which curves regularly into the rounded, distal border, is fringed with ciliated hairs as usual, with some plain hairs between them on the rounded apical border and the latter bears moreover some short slender spines.

The outer uropod, that has a characteristic rhomboidal form, is 1,9 mm. long and 1,36 mm. broad, nearly once and a half as long as broad; its almost straight, slightly sinuate, anterior border makes an acute, though rounded angle with the somewhat curved distal border and the curved posterior border appears more or less concave on its distal third or distal half. The outer uropod is fringed along its borders with feathered setae, that look as if composed of numerous joints, similar to those of the inner; the distal border is moreover thickly furnished with long, plumose, stiff setae that are not articulated, 0,8—1 mm. long posteriorly and that become shorter near the antero-external angle of the plate. The concave distal part of the inner border bears long slender spines, that are more strongly curved forward than in *Call.* (*Cheramus*) *orientalis* (Bate) and that gradually decrease in length. The outer uropod bears an additional, slightly arcuate row of close-set stiff setae, that extends from the obtuse antero-external angle of the plate to the middle of the distal border, diverging very little from it. The inner uropod bears one, the outer two longitudinal ribs down the middle.

In younger individuals the uropods appear less broadened in proportion to their length and the curved spines and the long stiff setae of the distal border are comparatively longer.

In the male the pleopods of the 1st and 2nd segment are apparently wanting. The pleopods of the 1st segment of the female are slender, uniramous filaments, those of the 2nd are also slender, though biramous, both with many outstanding setae. The abdominal appendages of the three following segments (Fig. 19*l*) are foliaceous and biramous, the exopodite somewhat longer and less broad than the endopodite, both fringed with ciliated, articulated setae. The endopodite of these three pairs of pleopods of the female bears a very short internal appendix, 0,22 mm. long, nearly as in *Call.* (*Cheramus*) *orientalis* (Bate), 4-times as far distant from the base than it is long, and furnished with many cincinnuli on the distal half of its outer margin (Fig. 19*m*).

The eggs are not very numerous, globular, diameter 0,4 mm. broad.

The eyestalks reach to the distal end of 1st antennular article; their straight, inner margins are contiguous, the outer converge forward, so that the eyestalks are less broad anteriorly than at their base; the antero-internal apices are more or less sharp, extending in some individuals farther forward than the rounded antero-external angles, but in other specimens the oblique lateral margins continue to the apices, without forming an antero-external angle. The black pigment of the eye is situated on the inner half of the stalks, in the middle, and divided in a larger inner and a smaller outer portion.

Antennular peduncle 1,5 mm. long [1]), the 1st joint, measured from the anterior border of the carapace, 0,6 mm. long; the 2nd is 0,3 mm. long and 0,18 mm. thick at the distal end, the 3rd 0,6 mm. long and 0,13 mm. thick in the middle. The 3rd joint, that tapers a little towards the distal end, is just twice as long as the 2nd and fringed on its lower border with long ciliated hairs. Of the two subequal flagella the lower is 2 mm. long, the upper 1,9 mm.; they are somewhat longer than the peduncle and these antennae, that measure 3,5 mm., are a little shorter than the carapace. The upper flagellum is a little thicker than

1) The measurements of the two pairs of antennae, of the external maxillipeds and of the thoracic legs are taken from a smaller specimen, collected also at Stat. 19, viz., from a female which was 16,8 mm. long (carapace 4,3 mm., abdomen 12,5 mm.).

the other and composed of 19 segments, that are nearly all somewhat longer than thick, so e. g. the 6th segment is 0,135 mm. long and 0,095 mm. thick at the distal end; the other flagellum is composed of 14 segments that are somewhat slenderer than those of the upper, so e. g. the 6th segment is 0,16 mm. long and 0,075 mm. thick distally, the segments of this flagellum are provided with a few long hairs at their distal ends.

Antennal peduncle as long as that of the inner antennae. The 1st joint is somewhat expanded, bulging out laterally, the antepenultimate joint reaches barely as far forward as the 1st joint of the antennular peduncle; the 2nd joint bears, nearly as in *Call. modesta*, a very small scale, only 0,11 mm. long, the pointed tip of which is curved inward; it is probably movable and should be considered as a rudimentary scaphocerite. The 4th or penultimate joint is 0,6 mm. long and 0,11 mm. thick in the middle; the terminal joint is 0,42 mm. long and 0,08 mm. thick in the middle; the 5th joint measures two-thirds the length of the 4th and both are a little slenderer than the peduncle of the inner antennae. In this specimen the flagellum was lost. In another from Stat. 47, the carapace of which is 4,16 mm. long, rostrum included, the penultimate joint of the antennal peduncle is 0,6 mm. long, the scaphocerite 0,11 mm., the last joint 0,5 mm.; the flagellum is 5,26 mm. long, a little longer than the carapace and more than 3-times as long as the peduncle. The flagellum is composed of 36 segments; the 1st segment, 0,22 mm. long, is almost half as long as the terminal joint of the peduncle and almost 3-times as long as the 2nd, which is 0,08 mm. long and just as broad; the following segments become gradually longer than broad and those of the distal half are also slenderer, so e. g. is the penultimate segment 0,16 mm. long and 0,035 mm. broad, 4-times as long as broad. In an egg-laden female, long 15 mm., from Stat. 5 the antennal flagellum is composed of 42 segments: the number of segments is thus variable.

The external maxillipeds (Fig. 19*c*) are subpediform. The two first joints are very small, the basipodite with a rounded inner border. The ischium is 1,08 mm. long, measured along its straight inner margin, and 0,58 mm. broad posteriorly; the anterior margin that articulates with the merus, is 0,34 mm. broad and runs a little obliquely, parallel with the concave hind border, that articulates with the 2nd joint. The outer margin is somewhat concave and both the outer and the inner pass posteriorly with a regular curve into the posterior margin. At the limit between the posterior and middle third part of its length the ischium appears just half as broad as long; while it grows broader backward, it decreases in breadth forward, so that the anterior border measures only one-third the length of the joint. The merus is triangular and the outer margin makes a nearly right angle with the oblique posterior that articulates with the ischium; the inner margin is slightly convex. The straight outer margin is 0,62 mm. long, the merus appears therefore almost twice as long as broad at its base; the oblique inner margin is 0,8 mm. long. The carpus, nearly 0,56 mm. long, little shorter than the merus, is much thickened distally, being here 0,28 mm. thick, at its base, however, 0,16 mm.; the outer border is slightly curved, the inner slightly sinuate. The propodus, 0,62 mm. long, is as long as the merus, barely longer than the carpus; it becomes less broad towards the distal end, being here 0,14 mm. broad, and 0,31 mm. not far from the articulation with the carpus. The narrow dactylus, 0,37 mm. long, tapers regularly to the extremity. All the joints are fringed with long, ciliated hairs, excepting the outer margin of the merus and a

few are implanted on the outer surface, about in the middle. The inner surface of the ischium is armed in this specimen with a row of nine strong spines, that runs obliquely from the antero-internal angle of the joint to the postero-external and a similar spine is placed on the inner surface of the basipodite; the inner surface of the ischium is also a little hairy posteriorly near the internal margin. The following joints bear a row of long setae on their inner surface near the inner margin.

In a female without eggs from Stat. 2, that is 16 mm. long, the ischium of the external maxillipeds appears somewhat less broad posteriorly; this joint is 1,06 mm. long, but the greatest width posteriorly is only 0,49 mm. The inner surface is armed not with 9, but with 16 spines. In a female without eggs from Stat. 5 the ischium of the external maxillipeds is 1 mm. long and 0,47 mm. broad, the inner surface bears 12 spines. The merus is 0,64 mm. long, its base 0,3 mm. broad. The number of spines on the ischium appears to be somewhat variable.

In their general appearance the anterior legs resemble those of some species of the subgenus *Trypaea*, namely of *Call.* (*Trypaea*) *australiensis* Dana, *maldivensis* Borr. and *brachyophthalma* A. M.-Edw. Either the right or the left is the larger. The larger cheliped agrees in its general characters with that of *Call. gigas* Dana and *Call. longimana* Stimps. In the female, long 16,8 mm., from Stat. 19 this leg (Fig. 19*d*) has a length of nearly 13,5 mm., being a little shorter than the body. The ischium, 2,7 mm. long, appears narrow along the proximal half, except the proximal extremity, that is slightly thickened; it becomes gradually broader from the middle to the distal end, the joint being here 0,84 mm. broad, 3-times as broad as proximally. The lower border bears three minute sharp teeth in the middle and is fringed with short setae, a few occur also on the upper border. The merus, 3 mm. long and 1,2 mm. broad in the middle, almost 3-times as long as broad, is a little longer than the ischium; it is trilateral, with a flattened, inner surface, whereas the slightly convex upper and the more flattened lower make a right angle with one another. The nearly straight upper margin bears two close-standing, rather small spines at the proximal extremity, of which the posterior is a little smaller than the other; sometimes, however, they are wanting. The lamellate, very sharp, lower edge is armed with a large spiniform tooth proximally and this tooth is often a little enlarged at its base. Both the upper and the lower margin are furnished with a few, rather short setae. The compressed carpus is 2,4 mm. long and just as broad at the articulation with the chela; of this joint, that is a little shorter than the ischium and the merus, both the straight upper and the regularly curved lower border are sharp and carinate, with rather obtuse distal extremities. The chela, measured to the tip of the immobile finger, is 4,8 mm. long, the palm 2,7 mm., so that the fixed finger appears distinctly somewhat shorter than the palm; the palm, proximally as broad as the carpus, decreases slightly in breadth distally, being 2,12 mm. broad at the articulation of the dactylus. The dactylus of this specimen is a little longer than the fixed finger and its tip is more strongly curved downward: both fingers (Fig. 19*e*) are furnished with about 20 small conical teeth, along the whole length of their prehensile border, and these teeth are a little larger in the middle than elsewhere. The fingers are hairy as usual, the carinate margins of the palm and the carinate lower edge of the carpus are fringed with rather short, close-set hairs. All the joints are smooth.

The length of the joints of the larger cheliped is, however, rather

variable, as is proved by other specimens. In an egg-bearing female, long 16,5 mm., from Stat. 19, the merus is 2,4 mm. long and 0,85 mm. broad, armed with the typical spines. The carpus is 2,3 mm. long and 1,75 mm. broad distally, the chela 3,65 mm. long, the palm 2 mm. In this specimen the carpus appears slightly longer than the palm and the carpus is also a little less broad than long.

In another female without eggs (Figs. 19*h*, 19*i*) from the same Station, long 14,5 mm., the merus is only 2,2 mm. long and 1,02 mm. broad in the middle, little more than twice as long as broad, and the lower border is more curved. The carpus is 2,2 mm. long and 1,9 mm. broad distally, the chela 3,45 mm. long, the palm 1,7 mm. long, the fingers 1,75 mm. The fingers that are distinctly longer than the palm and that are of equal length, are typically armed with 25 small conical teeth along the whole length of their prehensile border, somewhat larger in the middle than near the tip and a little smaller on the dactylus than on the fixed finger. In this specimen the carpus is also longer and even much longer than the palm and a little less broad than long.

In a young specimen, long 7,5 mm., from Stat. 53, the merus of the larger cheliped, placed on the left side, is 1 mm. long and half as broad; the lower margin bears the strong spine at the proximal end, but, opposite to it, the upper border does not bear two small spines, but one single spine, which is half as long as the spine on the lower. In this specimen the upper or thicker antennular flagellum is still only composed of 12 or 13 segments, the lower of 8.

Sometimes the two spines at the proximal end of the upper border of the merus are wanting, so e.g. in the ova-bearing female from Stat. 115. The ischium, 1,3 mm. long, is armed with three spines on its lower border, somewhat larger than usual, the posterior just behind the middle, the two others, gradually larger, on the distal half. The merus, 1,2 mm. long and 0,53 mm. broad in the middle, shows no trace of the dorsal spines, but the large spine on the lower border is well-developed. The carpus is 1,55 mm. long and 0,84 mm. broad distally, the chela 1,88 mm. long, the palm 1,04 mm. long. This specimen has a length of 12,5 mm.

The two dorsal spines of the merus are also wanting in a young male, long 12,5 mm., from Stat. 213; the proximal tooth on the lower border ends abnormally in two spines instead of one.

The smaller cheliped is much shorter and slenderer and its form is quite different. In the female, long 16,8 mm., from Stat. 19 this leg (Fig. 19*f*) measures 8,8 mm., i.e. about two-thirds the length of the larger cheliped. The joints are all strongly compressed. The slender ischium, 1,8 mm. long, is 0,28 mm. broad proximally, 0,29 mm. in the middle, and 0,5 mm. at the distal extremity, being here somewhat broadened; the lower border of this joint, which is 6-times as long as broad, bears a few short hairs and is armed with two small spines on its distal half. The merus, 1,44 mm. long, somewhat shorter than the ischium, is 0,62 mm. broad in the middle and is narrowed somewhat both proximally and distally; the merus which is quite unarmed, is slightly curved longitudinally, the upper surface is slightly convex transversely, the lower slightly concave; the merus is a little more than twice as long as broad, its upper border slightly arcuate. The slender carpus is 2,6 mm. long, more than one and a half times as long as the merus; it is 0,2 mm. broad at the proximal end, 0,47 mm. broad in the middle and 0,5 mm. at the distal extremity,

so that the carpus is five times as long as broad; the upper border is straight, the lower, at first arcuate, appears a little concave distally. The chela, measured to the tip of the fixed finger, is 2,1 mm. long, somewhat shorter than the carpus, and almost one and a half times as long as the merus; the palm, 0,8 mm. long, is 0,53 mm. broad. The palm, as broad as the carpus, is one and a half times as long as broad and the slender tapering fingers are one and a half times as long as the palm; the fingers are straight, their pointed tips not curved inward and their cutting-edges are entire, not denticulate. The lower border of the carpus, both the upper and the lower border of the chela and of the dactylus are fringed with rather long plain hairs; some setae occur also on the upper margin of the carpus. Figure 19*g* represents the smaller cheliped of the female, long 18,3 mm., from Stat. 19 and much resembles the described one.

The second chelipeds closely resemble those of *Call. rotundicaudata* (Th. R. R. Stebbing, South African Crustacea, 1902, Pt. II, Pl. VIII, prp 2). In the female, long 16,8 mm., from Stat. 19 the merus is 1,8 mm. long and shows its greatest width of 0,65 mm. at one-third its length from the base.

In the legs of the 3rd pair (Fig. 19*k*) the lobe on the hinder edge of the propodus is large, rounded below and posteriorly. The propodus is 1,2 mm. long with and 0,77 mm. without the posterior lobe, 0,66 mm. broad distally and 0,53 mm. at the articulation with the carpus. The lobe that measures a little more than one-third the whole length of the joint, is 0,54 mm. broad; opposite the carpal articulation the lower border of the propodus presents in the right leg four, in the other three shallow notches of equal length and there is a spine, long 0,15 mm., at the distal end of the border. The nearly straight dactylus is 0,7 mm. long, 3-times as long as thick and tapers towards the tip; the dactylus, the propodus and the distal end of the carpus are thickly fringed with long setae.

The genital apertures of the female are large.

The 4th and the 5th legs are also similar to those of *Call. rotundicaudata.* The merus of the 4th legs of the female, long 16,8 mm., is 1,75 mm. long and 0,46 mm. broad in the middle, nearly four times as long as broad, and it is one and a half times as long as the ischium. The carpus that has the same form as that of the smaller cheliped of the anterior legs, is 1,48 mm. long, a little shorter than the merus, and 0,38 mm. broad, presenting the greatest width near the distal extremity; this joint is also 4-times as long as broad. The propodus is 1,2 mm. long, nearly two-thirds the length of the merus, 0,4 mm. broad at the proximal and 0,32 mm. at the distal extremity; it is thickly fringed with hairs on the lower border and some setae are finely denticulate on their anterior edge; one of these denticulate hairs, just at the distal end, is 0,32 mm. long and a little stronger than the rest. Many long plain hairs are also observed near the upper margin and the straight dactylus, which is 0,54 mm. long, is immersed in long setae.

The sternal plaque, immediately behind the legs of the 4th pair, is almost as long as broad and broadest anteriorly; the lateral margins are S-shaped and the plaque is posteriorly bilobed, with two rounded lobes. The outer surface has one or two pits anteriorly on either side of the middle line. In the largest female, long 18,3 mm., from Stat. 19 the plaque is 0,92 mm. broad anteriorly.

The slender merus of the subchelate 5th legs, 1,6 mm. long and 0,27 mm. broad in the

middle, is 6-times as long as broad in the female, long 16,8 mm.; the carpus, 1,3 mm. long, shorter than the merus, is narrow at its base and becomes considerably wider distally, being here 0,36 mm. broad, 3-times as much as proximally. The chela, measured to the tip of the immobile finger, proves to be 1,26 mm. long, the palm just 1 mm., 4-times as long as the fixed finger; the chela, almost as long as the carpus, grows slightly broader until the articulation of the dactylus, being here 0,34 mm. broad, proximally, however, 0,28 mm. The triangular, slightly arcuate dactylus is little longer than the immobile finger; both fingers, like also the distal half of the palm, are thickly covered with setae.

Of the five specimens from Stat. 2 two are typical, but the three others do not fully agree with the preceding description. The largest is a female without eggs, long 16 mm. The telson differs from the typical species, because it is rounded posteriorly, presenting no straight posterior margin; it is slightly emarginate in the middle line and bears here a small tooth as in the typical species. The 3rd joint of the antennular peduncle is $2^1/_2$-times as long as the 2nd, a little longer than usual.

In another specimen, long 13 mm., the telson (Fig. 19*b*) has the same form as in the female long 16 mm. and is moreover just as long as broad, viz., 1,22 mm.; it is not emarginate in the middle line, but the median tooth is distinct. This specimen bears the smaller leg of 1st pair, (Fig. 19*f*), the larger is wanting in all the five specimens. The ischium is 1,2 mm. long, 0,25 mm. broad in the middle, 5-times as long as broad, its lower border is unarmed; the merus, also 1,2 mm. long and 0,51 mm. broad, presents the typical form, like also the carpus, that is 1,9 mm. long and 0,42 mm. broad. The chela, however, is 2,06 mm. long, the palm 0,82 mm. long and 0,58 mm. broad; the fixed finger is 1,22 mm. long. The chela is here a trifle longer than the carpus, not shorter as in the type, and the dactylus is not straight, but distinctly curved. These three specimens are provisionally considered as a variety.

Call. joculatrix de Man is referred to the subgenus *Cheramus* on account of the narrow external maxillipeds, the telson is, however, a little broader than long and rather short, so that this species could be placed with the same right in the subgenus *Callichirus*.

Call. (*Cheramus*) *orientalis* (Bate) from the Arafura Sea, in which the external maxillipeds are also narrow (Confer: J. G. de Man, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach, 's Gravenhage 1928, p. 9, Pl. I, fig. 2, 2*a*), the ischium and the merus being together also more than three times as long as broad, differs by a longer telson, of which the posterior margin is emarginate, by the outer uropod being shorter with regard to the breadth and by the 5th joint of the antennal peduncle being shorter than half the length of the 4th.

6. *Callianassa* (*Cheramus*) *lobetobensis* de Man. Pl. XIII, Fig. 20; Pl. XIV, Figs. 20*a*—20*d*.

Callianassa lobetobensis J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging, (2) IX, 1905, p. 607.

Stat. 306. Febr. 8, 1900. Lat. 8° 27′ S., long. 122° 54′.5 E. 247 m. Bottom: sandy mud. Two females, the larger with eggs, the other without eggs, bearing a Bopyrid in its cephalothorax.

This species, discovered in Lobetobi Strait between the islands of Flores and Solor, is apparently closely related to *Call. intermedia* from the Bali Sea. The larger specimen is 20 mm.

long, the carapace, rostrum included, 5,4 mm. long, the abdomen until the extremity of the lateral lobes of the telson, 14,6 mm., the proportion between both being the same as in *Call. intermedia*. The cervical groove, however, is situated at one-fourth the length of the carapace from its concave posterior margin, viz., at a distance of 1,34 mm. *Lineae thalassinicae* distinct. The rostrum is spiniform, acute, turned upward and reaches as far forward as in *Call. intermedia*, distinctly less far forward than the 1st joint of the antennular peduncle.

The abdomen resembles also that of *Call. intermedia*, as regards the shape and the relative length of the segments, excepting the caudal fan (Fig. 20), which presents some differences. The 2nd segment is very little longer than the 6th, but distinctly broader; the 6th is 2,5 mm. long, just as broad anteriorly, a little less posteriorly. Its posterior margin bears on each side two tufts of hair, the longest hairs measuring 1,9 mm. The four other segments show the same form in the two species.

Likewise as in *Call. pugnatrix* and *Call. intermedia* the telson is bilobed, its lateral borders are armed posteriorly with two movable spines and the median notch bears also a strong spine. Measured in the middle line to the base of the median notch, the telson appears to be 1,9 mm. long, but 2,22 mm., when measured laterally to the obtuse extremities of the lateral lobes, so that it appears little shorter than the penultimate segment. The telson is 1,75 mm. broad anteriorly, nearly one-fourth longer than broad; it is divided posteriorly by a rather deep median notch, 0,3 mm. long, into two obtuse lobes. At the concave base of the notch an acute spine is attached on the lower surface and this spine does not yet reach to the posterior end of the lateral lobes. The lateral margins of the telson run parallel until just beyond the middle and are furnished posteriorly each with two strong movable spines, that are strongly curved backward near their base; the posterior pair is inserted at the level of the base of the median spine and the two spines on either side are just as far distant from one another as the median notch is long. The anterior spine is 0,25 mm. long, a little shorter than the length or depth of the notch; the other is a little shorter and stouter. At one-fourth the length of the telson from its base the upper surface bears a transverse row of hairs, that are 1,7 mm. long, reaching to the end of the lobes; at the same level one observes near the lateral margins a small tuft of 3 or 4 very short hairs and a few hairs are implanted behind the median tuft. The telson is fringed posteriorly with articulated, plumose setae, that are 0,7 mm. long and, as in the other species, much thinner plain setae of unequal length are inserted all around the extremity of the lobes on their upper surface, and the longest of these setae are 1,2 mm. long.

Basal joint of caudal swimmerets rounded, unarmed. The inner uropod, which, extended backwards, appears to be a little shorter than the telson, is 2 mm. long and presents its greatest width of 1,18 mm. just beyond the middle; it is broadly rounded apically and appears a little more than half as broad as long. The anterior margin is straight along two-thirds the length of the plate and this straight part ends in a small sharp spine, 0,04 mm. long, which does not occur in *Call. intermedia*. This uropod is fringed with articulated, plumose setae; on the anterior half of the rounded apical border 9 or 10 movable bristles are implanted, the longest of which measure 0,3 mm. and are slightly curved backward; on the middle and on the posterior part of the apical border some plain setae are inserted, like the bristles, on the upper surface of the plate; the longest measure 1,3 mm. At a short distance

(0,22 mm.) from the middle of the apical border a small, movable spine or bristle, 0,08 mm long, is implanted on the upper surface and a few short hairs are scattered over it. The outer uropod is 2,32 mm. long and reaches for a short distance beyond the telson, when directed backwards; it gradually broadens apically and presents therefore its greatest width of 1,55 mm. not far from the truncate, apical border. The anterior border of the outer uropod, that is once and a half as long as broad, is straight, fringed on the lower side with ciliated hairs and makes a distinct right angle with the apical border; the latter curves regularly into the posterior border and is thickly clothed with ciliated setae of unequal length. The posterior border, also fringed with ciliated, articulated hairs, bears on its distal part a row of stout bristles, 8 or 9 in number and that are curved forward; the proximal bristles are 0,75 mm. long, the following decrease gradually in length. The additional row of bristles, that is 0,6 mm. long, extends almost to the middle of the apical border, is contiguous to it along its anterior half and diverges then very little from it; the row is composed of short, straight bristles, the posterior ones of which reach barely beyond the apical border.

The eyepeduncles that much resemble those of *Call. intermedia*, are 0,6 mm. long and 0,5 mm. broad at their base, little longer than broad; they are a little shorter than the 1st joint of the antennular peduncle and a little longer than the rostrum; their inner margins are contiguous, their tips truncate and their arcuate, outer border is anteriorly slightly concave. One observes near the middle of their inner border a small transverse spot of black pigment and more laterally and deeper some pigment more.

The inner antennae are in the larger specimen not equally long, a phenomenon observed also in other species: the left, indeed, measures 3,76 mm., the right 3,54 mm., owing to the flagella of the former being a little longer than those of the right antennula. The peduncle that reaches as far forward as the penultimate joint of that of the outer antennae, is 1,4 mm. long from its base until the insertion of the thicker, upper flagellum and 1,5 mm. until the inner, distal extremity of the 3rd joint. The 1st joint, that measures about one-fourth the whole peduncle, is broadened at its base, narrower at its distal end, where it proves to be 0,27 mm. broad, when the antennulae are looked at from above; the 2nd joint is 0,24 mm. long, two-thirds the length of the 1st, distally 0,23 mm. thick, proximally 0,18 mm., being anteriorly nearly as thick as it is long. The 3rd joint, 0,91 mm. long until its obtuse distal extremity, is almost 4-times as long as the 2nd; it is 0,19 mm. thick at its base, 0,17 mm. in the middle and 0,14 mm. at the insertion of the upper flagellum, so that this joint, which tapers distally, appears almost 5-times as long as thick. The upper flagellum, little shorter than the other, consists in both antennulae of 19 segments; the first segments are partly broader than long, so e. g. the 2nd 0,06 mm. long and 0,1 mm. broad; in the middle of the flagellum the segments are longer than thick, so is e. g. the 9th segment 0,155 mm. long and 0,1 mm. thick distally, once and a half as long as thick, the four following segments present the same measurements, the 15th is 0,095 mm. long and 0,085 mm. thick, the terminal segment is slenderer and longer, 0,11 mm. long and 0,03 mm. thick at its base. The 5 or 6 last joints are furnished with olfactory filaments.

The lower flagellum consists in the somewhat shorter right antennula of 14, in the left of 12 segments, which are all longer than thick, so e. g. is the 6th segment in the right

antennula 0,25 mm. long and nearly 4-times as long as thick, the 12th segment is 0,18 mm. long and 0,05 mm. broad, the last segment, finally, also 0,18 mm. long, but 0,03 mm. thick at its base and tapering. Looked at from above, the upper flagellum appears in the middle almost twice as thick as the lower, the proportion being as 11 : 6. The 2nd and the 3rd joint of the peduncle and the segments of the lower flagellum are furnished below with some long setae, of which a few, on the flagellum, are ciliate.

The antennal peduncle is 2,4 mm. long, the flagella are lost. The antepenultimate joint bears at its distal end the small, spiniform, acuminate scaphocerite, which is 0,17 mm. long and 0,09 mm. broad at its base; the penultimate is 1,1 mm. long, a little curved, and 6-times as long as thick, the terminal joint, finally, is 0,66 mm. long, measuring three-fifth parts of the penultimate.

The external maxillipeds (Fig. 20*a*) are pediform and much resemble those of *Call. modesta*. The rectangular ischium is 1,2 mm. long, measured in the middle and presents its greatest width of 0,56 mm. about at one-third its length from the base; this joint narrows slightly distally, so that the somewhat oblique anterior border, that articulates with the merus, is 0,37 mm. broad, two-thirds of the greatest width posteriorly; the inner margin, that is provided with long setae of unequal length, the longest measuring 1 mm., is straight, the outer border is slightly concave anteriorly and the postero-lateral angles are rounded. The ischium is thus somewhat more than twice as long as broad in the middle. The merus is rhomboid and proves to be 0,7 mm. long, when measured along its slightly curved, outer border, that is the longest of the four; the merus is thus a little more than half as long as the ischium. The nearly straight anterior border runs parallel with the posterior and is little longer than it; a small sharp spine, 0,08 mm. long and directed inward, occurs at the angle between the anterior and the distinctly convex inner border and the latter is furnished, like the ischium and like the inner margins of the following joints, with long setae. Just in the middle the merus is 0,54 broad, distinctly broader here than the anterior part of the ischium. The two following joints are equally long, viz., 0,6 mm., the propodus is once and a half as long as broad, the dactylus shorter, 0,46 mm. long and 3-times as long as thick. These maxillipeds differ from those of *Call. modesta* especially by the spine, with which the merus is armed, being placed in *Call. modesta* at some distance from the rounded antero-internal angle. The prominent crest on the inner side of the ischium is formed by 20—25 sharp teeth of unequal length and the rows of hair on the inner surface of the following joints are also well-developed.

In both specimens the right cheliped is the larger.

The slender ischium of the larger cheliped (Fig. 20*b*) is 2 mm. long and 0,4 mm. broad in the middle, 5-times as long as broad and thickening somewhat both distally and proximally; the slightly concave, lower border bears 8—10 spines, of which the 2—4 proximal ones are extremely small, the rest, on the distal half of the joint, larger. Merus oval, though truncate at both extremities, 2,2 mm. long and 0,92 mm. broad in the middle, exclusive of the spines of the lower border. The lateral borders of this joint, which is nearly as long as the ischium and about $2^1/_2$-times as long as broad, are a little curved; the lower border is armed with four spines on its proximal half, that are a little larger than those of the ischium and that grow a little longer from the first near the proximal extremity to the fourth

on the middle of the margin; a single spine, directed forward and as large as the spine on the middle of the lower, is placed on the upper border, at one-fourth the length of the merus from the articulation with the ischium. The carpus is 1,7 mm. long and 1,52 mm. broad distally, being thus a little shorter than the merus and slightly longer than broad; the upper border is straight, the lower regularly curved and both carry a few hairs. The chela is 4,1 mm. long to the pointed extremity of the immobile finger, the palm 2,5 mm. long and 1,8 mm. broad in the middle; the palm is thus one and a half times as long as the carpus and almost one and a half times as long as broad. The lower border of the chela is fringed with setae until the tip of the immobile finger, that are arranged in small tufts; the prehensile edge of the fixed finger is slightly convex in the middle but not denticulate; the somewhat curved, pointed dactylus, which is a little longer than the other finger, bears a low, obtuse tooth in the middle and its upper border is also setose.

The smaller cheliped (Fig. 20*c*) resembles that of *Call.* (*Cheramus*) *joculatrix* and of *Call.* (*Callichirus*) *Pestae*, the latter being a new mediterranean species described in 1928. The slender ischium is 2,12 mm. long, 0,38 mm. broad in the middle and 0,64 mm. at the articulation with the merus; the straight, lower margin of this joint, that somewhat widens from the middle to the distal end and that is 5-times as long as broad, is armed along its whole length with 9 small spines, of which the 4 or 5 proximal ones are very small, the following gradually a little larger, the foremost, not far from the distal extremity, being 0,1 mm. long, one-fifth the breadth of the ischium at this place; this margin bears also some short setae. The merus is 2 mm. long, almost as long as the ischium and has the same oval form as that of the larger leg; it shows its greatest width of 0,76 mm. in the middle, exclusive of the spine, being thus likewise $2^1/_2$-times as long as broad; the somewhat curved upper border is armed at one-fourth of its length from the proximal end with a spine, which is directed forward and twice as large as the foremost spine of the ischium; a similar spine, just of the same size, occurs in the middle of the little curved, lower margin that carries also some short setae and moreover an extremely small, sharp tooth, only 0,02 mm. long, which may easily be overlooked, exists at a distance of 0,25 mm. from the proximal end. The slender carpus is 2,5 mm. long, somewhat longer than the merus, 0,6 mm. broad in the middle, 0,66 mm. at the distal end, being thus 4-times as long as broad; a tuft of setae is placed at the distal end of the straight upper border and similar setae, 1 mm. long and shorter, are implanted along the lower margin. The chela is 2,85 mm. long, almost one and a half times as long as the merus and a little longer than the carpus; the palm is 1,15 mm. long and 0,68 mm. broad in the middle. The slender tapering fingers, the prehensile edges of which are entire and the pointed tips of which cross one another, are once and a half as long as the palm; both the upper and the lower border of palm and fingers are hairy.

The 2nd legs resemble those of the other species, the carpus is 1,4 mm. long and 0,74 mm. thick distally, half as thick as long.

The merus of the 3rd legs (Fig. 20*d*) is 2,16 mm. long, 0,46 mm. broad just in the middle and presents its greatest width of 0,49 mm. at one-third its length from the distal end, so that this joint appears nearly 5-times as long as broad. The carpus, 1,4 mm. long, measures two-thirds the length of the merus; 0,18 mm. broad at its proximal end, it grows wider

distally, so that the distal border is 0,65 mm. broad, i. e. almost half the length; the carpus bears, on its outer surface, a tuft of long setae near the distal end of its straight upper border and another in the obtuse angle, that makes the lower border with the distal one. The quadrangular propodus is 1,26 mm. long, measured between the truncate distal border and the obtuse tip of the lobe on the hinder edge, whereas it is 1,05 mm. long between the carpal articulation and the distal border. Measured in the first mentioned direction the length of the triangular proximal lobe appears to be one-fifth the length (1,26 mm.) of this joint; the upper border is slightly curved, it makes a right angle with the distal border and an obtuse one with the proximal. The angle between the distal border and the lower is rounded and bears a short spine; the lower margin, that until the proximal lobe runs parallel with the upper, presents three (in the other specimen four) shallow notches, nearly of the same length and, excepting these notches, it is thickly furnished with long hairs until the tip of the proximal lobe; these hairs are longest on the latter, measuring here 1,5 mm. The propodus presents its greatest width of 0,72 mm. in the middle of the upper border and is thus almost twice as long as broad; the upper border and the outer surface are also hairy. The dactylus, 0,7 mm. long, little more than half as long as the propodus and 3-times as long as thick, tapers to the point and is covered on its outer surface and along its margins with hair.

The slender carpus of the 4th legs is 1,7 mm. long and gradually widens distally; being 0,3 mm. broad just in the middle and 0,4 mm. at the distal end, it is 4-times as long as broad. The elongate lamellar propodus proves to be 1,54 mm. long, measured in the middle, and 1,4 mm., when measured along its straight upper margin; it is 0,38 mm. broad near its proximal end, 0,4 mm. in the middle and 0,3 mm. near the distal articulation, so that the propodus appears 4-times as long as broad. Its outer surface is covered with tufts of hair and the low is rather thickly beset with setae, especially distally, whereas one observes on the distal half of the lower border several denticulated setae. The dactylus, 0,66 mm. long, is not yet half as long as the propodus and also thickly beset with hair.

The legs of the 5th pair are cheliform and slender. The merus is 2,2 mm. long and 7-times as long as thick, slender; the slightly curved carpus is 1,65 mm. long, a little shorter than the merus, and grows gradually thicker towards the distal end which is 0,4 mm. thick, one-fourth of its length. The propodus is 1,85 mm. long until the tip of the immobile finger, a little longer than the carpus; the fingers are 0,52 mm. long and shut close together. The propodus is also somewhat curved, 0,3 mm. broad at its base and 0,36 mm. near the articulation of the fingers, and is thus 5—6-times as long as broad. The distal end of the propodus and the fingers are concealed by a brush of hair.

Sternal plaque bifid anteriorly, bilobed posteriorly.

The abdominal appendages of the 1st segment are slender, uniramous; those of the 2nd also slender, but biramous, the three following pairs of pleopods are biramous, but foliaceous, lanceolate; the stylamblys, inserted at two-fifths the length of the endopodite from its base, is very short, 0,3 mm. long, conical and furnished along the distal half of its outer border with cincinnuli. The endopodite is 2,5 mm. long.

The numerous eggs are ovate, 0,6—0,66 mm. long and 0,4—0,45 mm. broad, one and a half times as long as broad.

7. *Callianassa* (*Cheramus*) *intermedia* de Man. Pl. XIV, Fig. 21—21*d*.

Callianassa intermedia J. G. de Man, in Tijdschr. Ned. Dierk. Vereen. (2), Dl. IX, 1905, p. 609.

Stat. 5. March 10. Lat. 7° 46′ S., long. 114° 30′.5 E. 330 m. Bottom mud. One female without eggs.

Length 16,4 mm. Carapace, rostrum included, 4,4 mm. long, abdomen 12 mm., carapace, without rostrum, one-third the length of the abdomen. *Lineae thalassinicae* well-developed. Cervical groove deep, distance between the cervical groove and the concave posterior margin of carapace 0,9 mm., one-fifth the length of the latter. Rostrum (Fig. 21) spiniform, reaching a little beyond the middle of 1st joint of antennular peduncle, pointed. Carapace smooth, not carinate, without antennal tooth.

As regards the relative length and size of the segments the abdomen agrees with *Call. praedatrix* and other species, smooth above, not carinate. First segment, 1,4 mm. long, saddle-shaped, divided by a transverse groove in a less broad anterior and a wider posterior part, the latter grooved laterally as in other species. Second and 6th segments about of equal length, 2nd broader than 6th, hardly broader than long; the 3rd—5th as in *Call. praedatrix*, 6th 2,2 mm. long and broad (Fig. 21*a*). Antero- and postero-lateral angles of 6th segment with four tufts of setae as in *Call. praedatrix* and other species. The telson much resembles that of *Call. pugnatrix*, which occurs at the same locality. As in this species the telson is bilobed and the lateral margins are armed posteriorly with two movable spines (Fig. 21*b*). Measured in the middle line the telson proves to be 1,68 mm. long, but with the lateral lobes included 1,78 mm.; anteriorly at the level of its greatest width the telson is 1,6 mm. broad, posteriorly at the level of the posterior spines, 1,1 mm. The telson is a little longer than broad, even when measured in the middle line, and somewhat shorter than the 6th segment. The lateral margins converge slightly backwards, the lobes are rounded and the notch between them is 0,1 mm. deep, somewhat less deep than in *Call. pugnatrix*; different from this species but alike as in *Call. praedatrix*, an acute median tooth is attached on the lower surface of the telson, just near the bottom of the notch and this tooth reaches as far backward as the lateral lobes. A line, that unites the posterior pair of lateral spines, is 0,13 mm. distant from the median notch, nearly as much as the notch is deep; the spines are of equal length and shape, 0,14—0,15 mm. long, curved at their base and directed backward; they are as far distant from one another as they are long. The telson is fringed with plumose setae, those of the lobes are 0,6 mm. long, the long simple hairs on the margins of the lobes are 1,1 mm. long. At one-third its length from the anterior margin the upper surface bears in the middle a transverse row of long plain hairs, of which the longest extend to the end of the telson; a few short hairs exist also near the lateral edges and on the upper surface.

The uropods, on the contrary, resemble more those of *Call. praedatrix*, so that, as regards the characters of the caudal fan, *Call. intermedia* appears intermediate between the two others. Both uropods are short, not extending beyond the telson when directed backward. Basal joint rounded, unarmed, but there is a sharp tooth just near it on the outer uropod, above. Inner uropod 1,44 mm. long, 1,02 mm. broad, oval, not yet one and a half times as long as broad, rounded apically; anterior border straight proximally, posterior arcuate. Three or four slender movable spines, the longest of which is 0,3 mm. long,

are implanted on the apical border externally, 4 or 5 long plain hairs in the middle of it and a few also more inward. The outer uropod is very short, 1,64 mm. long, 1,36 mm. broad distally, only one-fifth longer than broad; 0,7 mm. broad at its proximal end, the outer uropod widens considerably, so that it appears almost twice as broad distally. Anterior border straight, making a right angle with the straight apical border that passes by a regular curve into the inner or posterior margin; antero-external angle obtuse, postero-external rounded. Both uropods are fringed with long multiarticulate hairs, apical border densely furnished, as in other species, with stouter, though also plumose setae, that are not articulate, of different length, the longest measuring 1,1 mm. As in other species the rounded postero-external angle is armed with 9 or 10 long, slender spines, that are curved forward; the first at the end of the inner border is the longest, 0,76 mm. long, the following gradually decrease in length. The outer uropod, similar to that of *Call. praedatrix*, though broader in proportion to its length, carries, as in other species, an additional row of spines that much resembles that of *Call. pugnatrix*. This row, indeed, is strongly arcuate and diverges rather much from the apical border, its inner extremity being 0,56 mm. distant from the anterior border and 0,36 mm. from the apical; it does not extend to the middle of the uropod and is composed of 8 or 9 slender spines, that are as stout as those of the postero-external angle and the innermost of which is the largest, 0,6 mm. long; they are slightly curved forward and project beyond the apical border. The outer uropod presents the two usual midribs and 2 or 3 hairs are observed near the anterior border, not far from the antero-external angle.

The appendages of the two first segments of the abdomen are slender filaments, uniramous on the first, biramous on the second, the three following pleopods are biramous, foliaceous, with a short stylamblys.

The eyestalks that are 0,46 mm. long, little shorter than the 1st joint of the antennular peduncle, are just as broad at their base, appearing rather broader than in other species; inner margins contiguous, apices obtuse, outer borders regularly curved and a large spot of black pigment, broader than long, is situated on the middle of the stalk.

Inner antennae 3,1 mm. long, shorter than the carapace. First joint of antennular peduncle 0,52 mm. long, 2nd joint, the shortest of all, 0,21 mm. long and 0,19 mm. thick distally; 3rd 0,52 mm. long, as long as 1st and $2^1/_2$-times as long as 2nd. The upper flagellum, 1,75 mm. long and 0,13 mm. thick or broad in the middle, is composed of 13 segments, that are nearly all a little longer than thick; so e.g. the 5th segment is 0,17 mm. long and 0,135 mm. thick, the 8th 0,15 mm. long, 0,13 mm. thick, the last 0,13 mm. long and 0,03 mm. thick at its base. The other flagellum, 1,84 mm. long and 0,07 mm. thick, is little longer, but much thinner, being only half as thick as the other; it consists of 11 segments, as usual slender and longer than thick, so e.g. is the 3rd segment 0,24 mm. long and more than 3-times as long as thick. This flagellum is furnished with long plain setae, the other bears the usual olfactory filaments; the flagella are once and a half as long as the peduncle.

The antennal peduncles extend with their terminal joint which is 0,6 mm. long, beyond those of the inner antennae; the penultimate joint is 0,8 mm. long and 0,14 mm. thick in the middle, almost 6-times as long as thick. The 3rd joint, that carries on its upper surface a small spine, the scaphocerite, extends as far forward as the 1st joint of the antennular peduncle. Flagella lost.

The external maxillipeds and the smaller cheliped are also wanting.

The ischium of the larger cheliped (Fig. 21*c*), which is placed on the left side, is 2 mm. long and resembles that of *Call. praedatrix*; being 0,4 mm. thick proximally and 0,76 mm. distally, it gradually grows thicker on the distal half, being here almost twice as broad. The lower border is armed with 9 spines that gradually grow longer distally. The merus, 2,2 mm. long and 1,1 mm. broad in the middle, exclusive of the spines, is just twice as long as broad and appears therefore somewhat less broad than that of *Call. praedatrix*; the upper border, much less curved than in this species, bears a short spine near the proximal extremity. The very sharp, expanded, lower margin is denticulate almost along its whole length, being armed with eight slender spines; of these those on the middle of the border are longer than the rest, 0,32 mm. long. The merus is trilateral, the upper surface making an obtuse angle with the lower and the inner surface is flattened; in *Call. praedatrix* this angle is less distinct. The carpus, 1,46 mm. long and 2,08 mm. deep, appears a little longer with regard to the merus than that of *Call. praedatrix*, but has for the rest about the same form. The chela resembles also that of *Call. praedatrix* and is 4,5 mm. long; the palm, 2,8 mm. long and 2,3 mm. broad, somewhat longer than broad, is almost twice as long as the carpus and longer than the fingers; the palm is broader than the carpus and both of the palm and the carpus the upper and the lower border are carinate. The slightly convex, outer surface is smooth, presenting no trace of a groove at the base of the fixed finger as in *Call. praedatrix*. The immobile finger carries one large tooth beyond the middle; the dactylus that is slightly longer, presents a rather small, obtuse tooth in the middle and between it and the tip 8 or 9 smaller teeth that gradually become smaller.

The 2nd legs resemble those of *Call. praedatrix* and other species, the carpus is 1 mm. long and 0,64 mm. broad distally.

Merus of 3rd legs (Fig. 21*d*) 1,64 mm. long, 0,42 mm. broad, four times as long as broad; carpus 1,08 mm. long, 0,56 mm. broad, presenting the same form as that of *Call. praedatrix*. The two last joints have also the same form as in this species. The propodus is 1 mm. long, 0,56 mm. broad in the middle, almost twice as long as broad; the lobe on the hinder edge is obtuse, 0,14 mm. long, i.e. one-seventh the whole length; the upper margin is as much curved as in *Call. praedatrix*, the lower presents three shallow notches that decrease in length distally and the first of which is a little farther distant from the distal than from the proximal extremity of the border, i.e. from the tip of the proximal lobe. The dactylus is 0,6 mm. long and 0,2 mm. thick at base, 3-times as long as thick, similar to that of *Call. praedatrix*. At the distal end of the lower border of the propodus not far from the articulation of the dactylus, one observes a movable spine, long 0,12 mm. The setae with which this leg as also those of the 2nd pair are fringed, are uncoloured.

The carpus of the 4th pair of legs is 1,3 mm. long and 0,38 mm. thick distally; propodus 1,12 mm. long, 0,38 mm. broad, 3-times as long as broad, a little shorter than the preceding joint and less slender than in *Call. praedatrix*. Lower border not prolonged distally as takes place in this species, so that the 4th legs are not subcheliform; lower border fringed with setae, that distally are denticulate. Dactylus 0,54 mm. long, 0,18 mm. thick. Sternal plaque bifid anteriorly, bilobed posteriorly.

Fifth legs cheliform as in *Call. praedatrix*. Merus 1,6 mm. long, 0,27 mm. thick in the middle; carpus 1,24 mm. long, 0,32 mm. thick not far from the distal end. Propodus until the distal end of the lower finger 1,28 mm. long, 0,27 mm. broad at the proximal extremity, 0,32 mm. in the middle and at the articulation of the dactylus, which is 0,43 mm. long. Distal end of propodus and dactylus immersed in a brush of long hairs as usual.

Though closely related to *Call. praedatrix*, *Call. intermedia* may be distinguished by the characters of the caudal fan, of the internal antennae, of the merus of the larger cheliped, of the propodus of 3rd legs etc.

Call. intermedia bears also some resemblance to *Call.* (*Trypaea*) *Bouvieri* Nobili from Djibouti, the type of which was kindly sent me for examination by Dr. Nobili. (G. Nobili, in: Annales des Sciences Nat. 9e Série. Zool. T. IV, Paris 1906, p. 105, Pl. VI, fig. 3). The merus of the larger cheliped has a different form, the dilatation of the lower border being comparatively larger and triangular; the upper border bears several teeth on its proximal half; the carpus is comparatively much larger, being but little shorter than the palm and but little shorter than broad: near the articulation with the chela the carpus is 3 mm. broad, whereas its greatest length in the middle (the posterior border being rounded) measures $2^2/_3$ mm. The chela, finally, $5^1/_4$ mm. long, has a different shape, the palm being emarginate at the base of the immobile finger, that has a slender, tapering form, slightly curved upwards towards the pointed tip and not toothed at all. The dactylus is armed with 2 or 3 strong teeth and the pointed tip is strongly curved downward.

The caudal fan bears a close resemblance to that of *Call. intermedia*, but the additional row of spines on the outer uropod extends about to the middle, diverges posteriorly little from the apical border and is beset with more numerous, less strong spines. The telson is only slightly concave in the middle of its posterior border, the emargination being less deep than in *Call. intermedia*.

8. *Callianassa* (*Cheramus*) *praedatrix* de Man. Pl. XV, Figs. 22—22*d*.

Callianassa praedatrix J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging (2) Dl. IX, 1905, p. 607.

Stat. 204. Sept. 20. Between islands of Wowoni and Buton; northern entrance of Buton-strait. Lat. 4° 20′ S., long. 122° 58′ E. 76—94 m. Bottom sand with dead shells. One female without eggs.

A species related to *Call.* (*Trypaea*) *maldivensis* Borr. and *Call.* (*Trypaea*) *Bouvieri* Nobili. Length 23 mm. Carapace long 5,9 mm., rostrum included, abdomen 17 mm., the carapace measuring about one-third the length of the abdomen. Rostrum spiniform, though rather not sharp, short, reaching to the middle of 1st joint of antennular peduncle. No antennal tooth on carapace. Carapace smooth, rounded, not carinate. *Lineae thalassinicae* and cervical groove distinct; distance between the latter and the posterior border of carapace 1,5 mm. long, one-fourth the length of the carapace, rostrum included. Abdomen, except the caudal fan, much resembling that of *Call. joculatrix* and *Call. pugnatrix*. First segment saddle-shaped, consisting of a less broad anterior and a wider posterior part, separated by a transverse furrow; 1st segment 1,8 mm. long, measuring three-fifths the length of the 2nd. When Borradaile's fig. 3*a* of *Call. maldivensis* (Fauna and Geography Maldive and Laccadive Archipelagoes, Vol. II, Part 3, Pl. LVIII)

is indeed accurate, then, of course, the 1st segment presents in this species a quite different form. Second segment 3 mm. long, quadrate, just as long as the 6th, both segments distinctly a little longer than the others. Length of 3rd segment three-fourths that of 2nd, 4th 1,65 mm. long, the shortest of all, 5th 2,65 mm. long, little shorter than 2nd and even slightly longer than 3rd; 6th segment (Fig. 22) a little longer than broad, its lateral margins slightly notched not far from the posterior margin, bearing, as in other species, a tuft of long setae on the postero-lateral angles and another between it and the middle line of the segment. Antero- and postero-lateral angles of the 2nd—6th segments rounded, obtuse.

Telson, measured in the middle line, 2,45 mm. long, on each side of the median notch 2,5 mm., this length being five-sixths that of the 6th segment (Fig. 22*a*). Anteriorly, at one-fourth its length from the anterior margin, the telson is 2,05 mm. broad, presenting here, as also in the middle, its greatest breadth, and appears therefore one-fourth longer than broad. The lateral margins are slightly arcuate in the middle, parallel anteriorly and converge somewhat posteriorly, so that the posterior border, 1,5 mm. broad, measures about three-fourths the greatest width. The posterior border presents a shallow triangular notch in the middle, 0,06 mm. deep and 0,5 mm. broad, i. e. one-third of its breadth; on each side of this median notch the posterior margin is slightly sinuate. The telson is armed in the middle line with a strong pointed tooth, long 0,32 mm., attached to the lower surface, just near the posterior margin and slightly curved forward. The posterior margin is furnished, except on the median notch, with short movable bristles, 0,1 mm. long, between which long plain hairs are inserted, some of which are 2 mm. long; below them one observes plumose setae that slightly become longer laterally, those near the lateral angles are 0,55 mm. long. The rounded postero-lateral angles bear a somewhat curved spine, long 0,25 mm., and not far from it, the lateral margin bears another similar spine of the same shape and size; the two spines are as far distant from one another as they are long. The lateral margins are also supplied with some plumose setae. A little in front of the middle the upper surface carries a transverse row of 8 or 10 bristles with a few long setae in the middle; the latter are 1,7 mm. long, the longest bristles 0,38 mm. Between this row and the lateral margin the telson bears two other smaller sets of bristles, the inner with 3, the other with 4. Three short, close-standing bristles are moreover observed on the upper surface just near the middle of the lateral margins and a few very short setae are dispersed upon it.

Extended backwards, both uropods project beyond the telson, the inner almost by one-third, the outer nearly by half its length. Basal joint unarmed, rounded, but there is a small sharp spine on the upper surface of the outer uropod, at its base. The inner uropod, 2,2 mm. long and 1,4 mm. broad, is oval, broadest in the middle, rounded apically and nearly one and a half times as long as broad. The inner uropod, fringed as usual with feathered hairs, bears on the distal half of its curved, inner or posterior border 9 or 10 slender, slightly curved bristles, the longest of which are 0,45 mm. long; like on the outer uropod there is an additional series of 12 or 13 similar bristles or spines close to the apical border externally. A few short bristles are placed, behind one another, on the upper surface near the anterior border; on the right uropod one observes 6 other bristles in two sets respectively of 4 and 2 on the distal end near the inner border, on the left 3, namely 2 more inward, the 3rd on the

middle line of the plate, all short and of unequal length. The breadth of the inner uropod is two-thirds that of the telson. The outer uropod, 2,9 mm. long and 2 mm. broad, not yet one and a half times as long as broad, is one-third longer than the inner and has a characteristic form. The nearly straight anterior border makes namely a right angle with the distal or apical one and this angle is not at all rounded or obtuse, as e. g. in *Call. joculatrix*, but distinctly angular; the distal border, also nearly straight, regularly curves into the posterior that is also slightly arcuate; this uropod presents therefore its greatest width about at one-third its length from the distal border and appears here just as broad as the telson. The outer uropod, fringed as usual with multiarticulate ciliated hairs, is very thickly beset with stouter, though also ciliated setae on the distal border, of which the longest measure 1,5 mm. As in other species the distal third of the posterior border is armed with 10 slender spines, which are slightly curved forward and 0,85 mm. long; this distal third part of the posterior border is not concave as in *Call. joculatrix*, but slightly convex, like the rest of this border. The additional series of short bristles, 0,7 mm. long, does not yet extend to the middle of the distal border and is nearly contiguous to it, diverging in a still less degree from the border than in *Call. joculatrix*. Except a few small bristles near the distal half of the anterior border, the upper surface is glabrous and unarmed, but presents, as usual, two ribs down the middle, that of the inner one.

First pleopods slender, uniramous, second also slender, biramous. The pleopods of the three following pairs are biramous, foliaceous, with a stylamblys that is somewhat shorter than its distance from the base of the endopodite.

The triangular eyestalks, 0,8 mm. long and 0,5 mm. broad at their base, one and a half times as long as broad and longer than the rostrum, reach almost to the distal end of 1st antennular article; their straight inner margins are separated by a narrow interspace and their apex is obtuse; the slightly convex cornea is situated on the middle of the stalk on its outer side and there is a small spot of black pigment situated somewhat farther from the tip than from the base.

The inner antennae, 5,2 mm. long, are almost as long as the carapace, rostrum included. First joint of their peduncle 0,86 mm. long, 2nd, the shortest of all, 0,38 mm. long and 0,3 mm. thick at the distal end; 3rd joint 1,14 mm. long, 3-times as long as the 2nd, 0,2 mm. thick in the middle, slender, almost 6-times as long as thick, supplied, like the 2nd, on its lower surface with long hairs. Flagella of subequal length, 2,8 mm. long, a little longer than the peduncle (2,4 mm). Upper flagellum 0,11 mm. thick, barely thicker than the other, composed of 23 segments, that are partly as long as, partly a little longer than thick; the 9th segment, 0,18 mm. long and one and a half times as long as thick, is slightly longer than the rest; the segments of the distal half are as long as thick, except the terminal one, which is 0,14 mm. long, 4-times as long as thick at its base. Olfactory hairs few in number. The other flagellum, 0,08—0,09 mm. thick, consists of 16 segments, that are longer than thick and become slenderer distally; it is furnished with more and longer hairs than the upper.

The antennal peduncle extends almost with the whole terminal joint beyond the distal extremity of the peduncle of the inner antennae. The 2nd joint, furnished above with a curved

spine, as small as in the other species, reaches as far forward as the 1st joint of the antennular peduncle; the 4th joint, 1,4 mm. long and 0,16 mm. thick in the middle, being here less thick than the 3rd joint of the other peduncle, though slightly thickening at both extremities, is 8 or 9-times as long as thick. The terminal joint, 1 mm. long, is 0,14 mm. thick in the middle; the flagella are lost.

The external maxillipeds (Fig. 22*b*) closely resemble those of *Call.* (*Calliactites*) *rotundicaudata* Stebbing (South African Crustacea, Pt. II, 1902, Pl. VIII, mxp. 3). The first two joints small, unarmed. Ischium and merus as much expanded as in this species, the former 1,64 mm. long and 1,11 mm. broad in the middle, one and a half times as long as broad; posterior margin 0,6 mm. broad, anterior border that articulates with the merus, 1 mm. broad, somewhat oblique, parallel with the posterior; outer border straight, inner very slightly curved and densely fringed with hairs that are little shorter than the merus is broad. A few setae are inserted on the outer surface of the ischium, especially anteriorly. The inner surface of the ischium carries, as in other species, a prominent comb, that runs nearer to the outer border than to the inner; this comb, which is slightly curved outward at its posterior extremity, is armed with 33 acute teeth of various size, larger teeth alternating with smaller ones. Measured in the middle, the merus proves to be 0,92 mm. long, exclusive of the anterior spine and 1,04 mm., when the spine is included; the merus, 1,24 mm. broad, is a little broader than long and slighty broader than the ischium. The posterior margin that articulates with the latter, is 0,85 mm. broad; the outer border is regularly curved as in *Call. rotundicaudata*. In the middle of its anterior border the merus is armed with a rather small, sharp spine, directed inward, 0,11 mm. long; from this spine until the postero-internal angle the border appears regularly curved, an antero-internal angle wanting completely; the rest of the anterior border between the spine and the antero-external angle is slightly concave. The arcuate inner margin is fringed with hairs, partly ciliated like those on the inner margin of the ischium; the outer surface on which many ciliated hairs are dispersed, is covered near the antero-internal border with very numerous, microscopical teeth or tubercles, that are 5 or 6 μ long; the row of setae on the inner surface is strongly developed. Carpus and propodus of subequal length, the carpus being 0,8 mm. long, the propodus 0,94 mm.; the former is 0,48 mm. thick distally, the propodus presents its greatest width of 0,53 mm. at two-fifths its length from the proximal articulation, being here a little more than half as broad as long. The somewhat tapering dactylus, 0,6 mm. long, is a little shorter than the two preceding joints and its greatest width, not far from the articulation, is one-third its length. The three last joints are provided with long hairs as in other species.

Ischium and basipodite combined of the right cheliped, the larger one, are 3,4 mm. long. The ischium, 0,68 mm. broad proximally, is much thickened on its distal half, being here 1,2 mm. broad, almost twice as thick as at the proximal extremity; the lower border is armed with 11 small spines, that slightly grow longer distally, the first being 0,03 mm. long, the last 0,15 mm., measured on their anterior edge. The merus, 3,5 mm. long and 2,4 mm. broad in the middle, is broadly oval, its lower margin being regularly dilated, so that this joint presents its greatest width in the middle of its length; it is almost one and a half times as long as broad. The lower surface is flattened,

the upper somewhat convex both transversely and longitudinally. The not very sharp upper border is regularly curved and nearly glabrous, the much sharper, lower border is denticulate almost along its whole length, the smaller proximal half armed with 6 small spines, nearly as long as those of the ischium, the rest of the border presenting small irregular, obtuse denticulations; the lower margin is also fringed with short hairs, implanted on the lower surface. The carpus, which is unarmed, proves to be 2,1 mm. long, measured along its upper margin, shorter than the merus, 3,36 mm. deep, more than one and a half times as deep as long; its regularly curved posterior margin is little expanded. Chela 7,15 mm. long, palm 4,4 mm. long and 4 mm. broad; the palm is twice as long as the carpus and slightly longer than the fingers. The outer surface of the palm which is a little longer than broad and a little broader than the carpus, appears slightly convex, both transversely and longitudinally; it is marked with a short longitudinal groove, that runs parallel with and not far from the lower border, at the base of the immobile finger; smooth in the middle and near the upper and lower margins that are carinate, the palm appears somewhat rugose on the rest of its outer surface. The inner surface of the palm is more flattened, presents, however, also a trace of a groove at the base of the fixed finger and appears at the level of this groove also a little rugose. The lower border of the palm is entire, not saw-like as in *Call. maldivensis*, and fringed, like the lower edge of the carpus, with short hairs within; the fingers, setose as in other species, are hardly denticulate; lower border of the fixed finger carinate.

Smaller cheliped wanting.

Second legs similar to those of *Call. rotundicaudata* and other species: the carpus is 1,5 mm. long and 0,83 mm. broad distally.

The legs of the 3rd pair (Fig. 22*d*) much resemble those of *Call. pugnatrix* de Man. Merus 2,3 mm. long, 0,66 mm. broad, $3^1/_2$-times as long as broad; carpus 1,7 mm. long, 0,88 mm. broad at the distal end, upper border straight, not slightly concave as in *Call. pugnatrix*. The propodus is 1,6 mm. long, 0,94 mm. broad in the middle, its upper border a little more curved than in *Call. pugnatrix*, the joint appearing therefore somewhat broader than in that species. The lobe on the hinder edge, 0,26 mm. long, one-sixth the length of the propodus, appears a little less obtuse, the proximal half of the lower border being straighter; the distal half of the latter is slightly emarginate at three places, the three shallow notches are of equal length and the first is a little farther distant from the proximal than from the distal end of the border. The distal border that articulates with the dactylus, is 0,4 mm. broad; there is a short spine, 0,1 mm. long, close by the distal end of the lower border. The dactylus, 0,9 mm. long, is 0,36 mm. broad and is a little thicker than in *Call. pugnatrix*. The hairs on the lower border of carpus and palm are, both in the 2nd and 3rd legs, orange coloured at their base.

Merus of 4th legs 2,75 mm. long and 0,53 mm. broad in the middle, 5-times as long as broad; carpus 1,9 mm. long, 0,47 mm. thick distally, 4-times as long as thick; propodus 1,92 mm. long, as long as the carpus, 0,415 mm. broad in the middle, almost 5-times as long as broad. The lower border of the propodus is prolonged distally into a short triangular tooth, so that this leg appears slightly subcheliform; the lower margin is fringed with long

hairs, that are orange-coloured at their base and it is thickly clothed with denticulate setae distally. The dactylus is 0,8 mm. long and 0,26 mm. thick in the middle, 3-times as long as thick, it does not taper from the base to the tip as in *Call. pugnatrix*, but appears even a little narrower at its base, viz., 0,24 mm.; it is furnished also with orange coloured hairs.

The 5th legs are cheliform. Merus 2,3 mm. long, 0,36 mm. broad in the middle; carpus 1,7 mm. long, 0,46 mm. thick not far from the distal extremity. The propodus is 2 mm. long until the extremity of the fixed finger, 0,4 mm. broad in the middle and 0,42 mm. at the articulation of the dactylus; the slightly curved dactylus, 0,56 mm. long, is but very little longer than the immobile finger. The distal end of the propodus, as far as a line running from the articulation of the dactylus to the middle of the lower border, as also the dactylus, are immersed in a brush of long hairs.

Call. (*Trypaea*) *Bouvieri* Nobili from Djibouti is at once distinguished by the characters of the larger cheliped, by the antennal peduncle being shorter than that of the inner antennae etc. (Confer p. 146).

9. *Callianassa* (*Cheramus*) *pugnatrix* de Man. Pl. XV, Figs. 23, 23*a*; Pl. XVI, Figs. 23*b*–23*e*.

Callianassa pugnatrix J. G. de Man, in: Tijdschr. d. Nederl. Dierk. Vereeniging, (2) Dl. IX, 1905, p. 611.

Stat. 5. March 10. Lat. 7°46′ S., long. 114°30′.5 E. 330 m. Bottom mud. One specimen.

A species probably of small size. Length, rostrum included, 15 mm., carapace 4,2 mm. long, abdomen 10,8 mm.; carapace, rostrum included, longer than one-third the length of the abdomen, exclusive of the rostrum it measures exactly one-third of it. Carapace smooth, without antennal tooth. *Lineae thalassinicae* and cervical groove distinct, distance between the latter and the concave hind border one-fifth the length of the carapace, rostrum included. Rostrum (Fig. 23) slender, spiniform, as long as first joint of antennular peduncle.

Abdomen resembling that of *Call. joculatrix* as regards the relative length of the segments, excepting the telson, which has a quite other form than in that species, with which it has been taken at the same Station. First segment considerably shorter than 2nd, narrowed in the middle, wider posteriorly than anteriorly. Second segment 2 mm. long, 2,2 mm. broad, distinctly longer than the rest; 3rd segment two-thirds of the 2nd, 4th a little shorter than 3rd, 5th slightly longer than it; the 6th segment (Fig. 23*a*), 1,9 mm, long and 2 mm. broad anteriorly, is a little less broad than the 2nd, but very little shorter; the lateral margins which are slightly notched not far from the posterior border, converge somewhat backward, so that the posterior margin, which is slightly sinuate in the middle, appears a little less broad than the breadth of this segment anteriorly. The hind border of the 6th segment bears, as in other species, a tuft of hairs on the rounded lateral angles and another between that tuft and the middle line. The broadened posterior part of the saddle-shaped, first segment is furrowed laterally. Postero-lateral angles of the four following segments obtuse; pleura of the 3rd—5th segments with a large pit, furnished with setae, near the middle of their lateral margin and another smaller one behind it; a similar hairy, impressed point is also observed on the 2nd segment near the postero-lateral angle.

Telson bilobed posteriorly, the rounded lobes separated from one

another by a deep notch, that bears in the middle line a slender acute tooth (Fig. 23*b*). Measured in the middle line, the telson proves to be 1,6 mm. long to the extremity of the median tooth and 1,47 mm., when the tooth is excluded; measured to the posterior end of the lateral lobes, the telson appears 1,66 mm. long. Anteriorly where the telson shows it greatest width, it is 1,48 mm. broad; posteriorly at the level of the bases of the posterior lateral spines the width is 1,12 mm. The telson appears nearly quadrate, slightly longer (the lobes included) than broad anteriorly; the antero-lateral angles are rounded, the lateral edges, that are a little concave in the middle, distinctly converge backwards and the slender median tooth reaches not yet as far backwards as the rounded lateral lobes. Posteriorly the lateral margins bear two movable spines of equal length, 0,11 mm. long (Fig. 23*b*); of these spines that are nearly as long as the median tooth, the posterior is inserted a little before the base of that tooth, the other twice as far distant from the posterior as the spines are long. At one-fourth its length from the anterior border the telson presents in the middle a transverse row of setae, 4 or 5 on either side of the middle line; nearest to the middle line a long hair, 0,7 mm. long, next to it a much stouter, though shorter seta, then a similar still shorter seta and a short hair. Three or four hairs, each with a much shorter one near it, are observed near the lateral margins and a few minute hairs exist on the upper surface. The rounded lobes are fringed with ciliated setae and on the outer part of their border with a tuft of longer plain hairs, some of which are 0,9 mm. long.

The uropods, extended backward, project beyond the telson, the inner by one-third, the outer by half its length; the basal joint is armed with a small spine. The oblong inner uropod, 1,55 mm. long, 0,82 mm. broad, is almost twice as long as broad, anterior border straight, posterior a little curved, extremity rounded, obtuse; the upper surface bears on the proximal half one shorter and two larger setae, one, 0,56 mm. long, just before the middle, nearer to the middle line of the plate than to the anterior border, another of the same length about in the middle between the former and the base of the plate, a third seta, 0,23 mm. long, is inserted just near and on the inner side of the first. The inner uropod is fringed with long, ciliated, articulated setae; on the outer side of the obtuse distal extremity are 2 or 3 rather short, slender setae and between these and the inner border several long plain hairs. The outer uropod, 1,86 mm. long and 1,24 mm. broad, is longer than the inner and just one and a half times as long as broad; rather narrow, 0,7 mm. broad, near the articulation it gradually widens along two-thirds its length from the base, is distally broadly and regularly rounded and appears therefore pear-shaped. The borders are fringed with ciliated articulated hairs, the rounded apical border is moreover furnished with long, stiff, ciliated setae, that are 1,3 mm. long and diminish in length towards the anterior margin; on the inner part of the distal border, between the long setae and the inner margin, occur, as in other species, 7 or 8 slender, not ciliated spines that are slightly curved forward and on the remaining outer part of the distal border several shorter straight spines. The additional row of spines on the antero-external part of the upper surface is rather much curved, but short, 0,3 mm. long, measuring only one-fourth the width of the uropod; it diverges rather considerably from the distal border, the inner end of the row being as far distant from it as the row itself is long. The row is composed of 9 or 10 spines,

that reach a little beyond the distal border of the plate. The inner uropod bears one, the outer two ribs down the middle; the inner uropod is a little more than half as broad as the telson, the outer appears in the middle as broad as it.

The genital apertures were irrecognizable, so that it remained doubtful whether this specimen is a male or a female. The 1st segment of the abdomen bears a pair of slender, rather short, uniramous filaments, the 2nd is devoid of appendages, but has perhaps lost them. The pleopods of the three following segments are foliaceous, the exopodite slightly longer but almost as broad as the endopodite; all provided with a stylamblys long 0,3 mm., just half as long as its distance from the base of the endopodite.

Eyestalks (Fig. 23) triangular, very little shorter than basal antennular article, of the usual shape, blackish pigmented at the base of the yellowish coloured, distal half of the stalks.

Inner antennae 3,2 mm. long, three-fourths the length of the carapace. Antennular peduncle 1,5 mm. long; length of 1st joint, i. e. the distance between its distal extremity and a line uniting the postero-lateral angles of the eyestalks, 0,58 mm. long, 2nd joint 0,24 mm. long, the shortest of all, 0,2 mm. thick distally; 3rd 0,7 mm. long, 0,17 mm. thick in the middle, 3-times as long as 2nd. Second and third joint provided on their lower border with some long plain hairs, the longest measuring one millimeter. The upper flagellum, the distal half of which is provided with olfactory filaments, is much thicker and a little shorter than the other; it is 1,4 mm. long and composed of 12 or perhaps 13 segments, that are short and thick, except the last one. In a lateral view the 1st segment appears one and a half times as long as thick at the distal end, the 2nd, 0,1 mm. long, is once and a half as broad; the following segments are also thicker than long, the 6th, 0,16 mm. long and 0,18 mm. thick, is the thickest of all; the 8th segment is 0,13 mm. long, 0,14 mm. thick, the three following, gradually smaller, are as long as thick, the terminal segment, that tapers, is 0,12 mm. long and 0,04 mm. thick at base. The lower flagellum is 1,7 mm. long, a little longer than the upper; it is composed of 9 segments, which are nearly all slender, longer than thick. The 1st segment, 0,09 mm. long, appears in a lateral view, almost just as broad; the 2nd, 0,12 mm. long, is once and a half as long as thick; the four following are subequal, measuring 0,16 mm. and nearly twice as long as thick; the 7th segment, 0,24 mm. long, is almost 4-times as long as thick and appears a little longer than the rest, the penultimate measuring 0,2 mm., the terminal segment, finally, 0,19 mm. Both flagella, the lower of which is a little longer than the peduncle, carry a few long hairs at the distal end of their segments.

Antennal peduncle (the flagella of either of them are lost) little longer than that of the inner antennae, extending by half its terminal joint beyond it. The 2nd joint that reaches almost as far forward as the 1st joint of the antennular peduncle, bears, as in *Call. modesta* and *Call. joculatrix*, a small slender spine, 0,16 mm. long and slightly curved inward. The 4th or penultimate joint, 0,7 mm. long, reaches to the middle of the 3rd joint of the other peduncle and the terminal joint is little more than half as long as the penultimate.

The external maxillipeds (Fig. 23*c*) closely resemble those of *Call.* (*Calliactites*) *modesta* de Man, but the merus bears no spine on its anterior border. The two first joints are small. The almost rectangular ischium is 0,92 mm. long, 0,49 mm. broad posteriorly, whereas the anterior border is 0,4 mm. broad; in the middle this joint appears exactly half

as broad as long; outer margin slightly concave, inner straight, postero-external and postero-internal angles rounded. The merus has a slightly curved outer margin, that is 0,6 mm. long; its posterior border that articulates with the ischium, is 0,36 mm. broad; the anterior margin is straight, 0,48 mm. broad and runs somewhat oblique, because the arcuate convex inner margin, into which it passes without forming an angle, is considerably shorter than the outer. The merus appears therefore a little broader than the ischium and anteriorly once and a half as broad as at its base. The three last joints resemble those of *Call. modesta*, the propodus, however, is a little broader, this joint being 0,55 mm. long and 0,34 mm. broad. As regards the long, plain hairs, with which the three last joints and the inner border of merus and ischium are fringed, this species agrees with *Call. modesta*, a few setae are also observed on the outer surface of ischium and merus. The prominent comb, armed with 27 or 28 sharp teeth of different size, larger teeth alternating with 2 or 3 smaller ones, also resembles that of *Call. modesta*, as regards its form and situation, and both species agree likewise as regards the rows of hairs on the inner surface of the following joints.

The ischium-joint of the left cheliped (Fig. 23*d'*), the larger one, is together with the basipodite 2 mm. long. This joint, that widens towards the distal extremity, being here 0,73 mm. broad, proximally, however, 0,4 mm., has the lower margin armed with six acute spines that slightly increase in length; the first spine is as far distant from the proximal extremity as the 6th from the distal. The slightly concave upper margin carries some setae. The merus, 1,8 mm. long, nearly as long as the ischium, is just twice as long as broad and armed at the base of its lower margin with a very strong tooth or spine, the pointed tip of which is curved forward and that appears as long as the merus is broad at its base. The lower margin bears some hairs along its whole length and a few are observed on the slightly curved upper border. Carpus compressed as in other species, 2 mm. long, measured along its upper margin, and 1,84 mm. broad distally; distal extremities of both upper and lower margin obtuse, the lower fringed with hairs, that are 0,65 mm. long. Measured along its lower border the chela proves to be 4 mm. long; the palm is 2,5 mm. long and presents its greatest width of 2 mm. at one-third its length from the carpal articulation, so that it is a little longer than wide. The palm that slightly narrows distally, is distinctly longer than the fingers that cross one another when closed, and also longer than the carpus. The immobile finger carries one strong conical tooth in the middle and on each side of it the cutting-edge presents minute, hardly perceptible denticulations; the dactylus bears a long depressed tubercle just behind the middle of its cutting-edge; this tubercle or tooth that measures one-fifth the length of the finger, appears slightly concave and does not extend to the articulation; between the tooth and the extremity of the finger the cutting-edge presents fine denticulations, that at first are a little larger than those of the fixed finger, but become distally also almost hardly perceptible and do not reach to the tip. The distal border of the palm bears moreover a small obtuse tooth just above the cutting-edge of the immobile finger. The upper and the lower border of the carpus are carinate as also the lower border of the chela and the upper of the palm. The lower border of the chela is fringed with similar hairs as exist on the carpus and the pointed fingers bear the usual tufts of hair.

The 2nd chelipeds resemble those of *Call. modesta*, but they have a stouter shape.

The merus, 1,8 mm. long, is 0,57 mm. broad, almost three, instead of four, times as long as broad and appears widest not beyond the middle, but a little before it. The carpus, 1 mm. long, is 0,6 mm. thick at the distal end; the chela, finally, 1,44 mm. long (palm 0,44 mm., fingers 1 mm.), is 0,71 mm. broad, almost exactly half as broad as long.

The merus of the 3rd legs (Fig. 23*e*) is 1,5 mm. long and 0,41 mm. broad in the middle, being almost 4-times as long as broad; the lower border is provided with a few distantly placed hairs, the proximal of which are longer than this joint is broad. The carpus is 1 mm. long and exactly half as broad distally. The lobe on the hinder edge of the propodus is little developed and obtuse, so that in my opinion this propodus forms a connecting link between the propodus of a species of the subgenus *Calliactites*, e. g. *Call. modesta*, and that of one of the subgenera *Trypaea* or *Callichirus*, in which this lobe is large and well-developed. The propodus is 1,13 mm. long and 0,58 mm. broad a little beyond the carpal articulation, at two-fifths the length of the propodus from its posterior extremity; the propodus is thus half as broad as long. The length of the obtuse posterior lobe, i. e. the distance between its posterior extremity and the carpal articulation, 0,18 mm., is but one-sixth the length of the propodus; the propodus narrows towards the distal extremity, the distal margin that articulates with the dactylus, being 0,2 mm. broad. The lower border is armed with an apparently movable spine, long 0,24 mm., at the distance of 0,13 mm. from the distal end; posterior to this spine the lower border appears in one leg two, in the other three times slightly emarginate on the distal half and these notches are of unequal length, the distal one being the longest; the long setae are in these notches wanting. Long setae are also observed on the distal half of the upper border and on the outer surface of the propodus, like also on the extremities of both the upper and the lower border of the carpus. The tapering dactylus, 0,56 mm. long and 0,16 mm. broad at its base, is just half as long as the propodus and also fringed with hairs.

The merus of the 4th legs is 1,7 mm. long and 0,35 mm thick in the middle, 5-times as long as thick, with a few setae, long 0,7 mm., at the end of the upper border. Carpus 1,2 mm. long, 0,32 mm. thick at the distal end, 4-times as long as thick. Propodus 1,26 mm. long, almost as long as the carpus, 0,36 mm. broad in the middle, $3^1/_2$-times as long as broad; this joint narrows a little distally, the distal margin that articulates with the dactylus, being 0,2 mm. broad. Lower margin fringed with long hairs, that are here and there ciliated, and supplied along its distal third with shorter setae, that are regularly ciliate on their anterior margin; at the distal end one observes, as in *Call. joculatrix*, a stronger seta, that is 0,36 mm. long and 0,026 mm. thick at its base, two-thirds the length of the dactylus, and the distal half of the anterior margin of this seta carries 9 small teeth. Dactylus 0,56 mm. long and 0,15 mm. broad at its base; it is straight, provided with long hairs on each side. Propodus and dactylus are also furnished with long hairs on their outer surface, near the upper margin.

Sternal plaque posterior to 4th pair of legs as in *Call. joculatrix*, bilobed posteriorly.

The legs of the 5th pair are wanting.

10. *Callianassa* (*Cheramus*) *pygmaea* n. sp Pl. XVI, Figs. 24—24*g*.

Stat. 181. Sept. 5/11. Ambon-anchorage. 54 m. Bottom mud, sand and coral. Two females, one of which is egg-bearing.

The two specimens are unfortunately badly damaged, in one the larger cheliped and the legs of the 4th pair are wanting and the antennal flagella incomplete, in the other both antennulae, both external maxillipeds and both legs of the 1st pair are lost, while the legs of the 3rd and 4th pair are also wanting or incomplete; the latter specimen bears still about a dozen of eggs, that are globular with a diameter of 0,3 mm. and of a red-brown colour.

The first specimen that will be described, is about 11 mm. long from tip of rostrum to end of telson and belongs thus to the species of small size, like *Call.* (*Calliactites*) *modesta* and *Call.* (*Cheramus*) *propinqua*, though *Call.* (*Cheramus*) *minima* Rathbun from Porto Rico is still smaller, the male being only 9 mm. long. In this specimen from Stat. 181 the carapace proved to be 2,85 mm. long, about one-fourth the whole length. Rostrum (Fig. 24 and 24*a*) spiniform, acuminate, arising from the whole width of the frontal border, with the lateral borders concave, and almost as long as basal antennular article; no lateral frontal teeth or prominences. Distance between the cervical groove and the posterior border of the carapace 0,42 mm., one-seventh the length of the carapace.

Second segment of abdomen 1,7 mm. long, the longest of all; 6th segment (Fig. 24*b*) 1,4 mm. long, presenting its greatest width of 1,26 mm. a little behind the 5th segment, a little longer than broad, lateral borders slightly convergent and notched at the posterior fourth. Telson, measured in the midline, 0,8 mm. long, at either side of the triangular median sinus 0,83 mm.; there is a very small, sharp tooth in the sinus, which tooth is 0,025 mm. long. The telson, which is a little more than half as long as the 6th segment, presents its greatest width of 0,96 mm. at one-third its length from the posterior border of that segment and proves to be one-seventh broader than long; behind the greatest width the lateral margins are slightly concave, converge and pass with a regular curve into the posterior lobes. At either side (Fig. 24*c*) two movable spinules are implanted, the anterior 0,04 mm., the posterior 0,06 mm. long and 0,025 mm. distant from one another; the anterior spinule is implanted at the end of the lateral margins. At the level of the greatest width in a transverse line 3 or 4 small spinules are implanted on the upper surface and a few long setae that reach to the posterior extremity.

Uropods much longer than telson. From the distal border of the unarmed basal joint a spiniform process proceeds on to the outer uropod. The outer uropod is 1,35 mm. long, 0,76 mm. broad, almost twice as long as broad, presenting its greatest width at the distal third. Anterior border a little curved on its distal half, armed with a movable spine, long 0,13 mm., at one-fourth its length from its distal extremity; the anterior border makes a distinct obtuse angle with the distal border that is rounded and regularly curves into the arcuate posterior border; overagainst the movable spine on the anterior border on the posterior the first of a row of movable, slender, curved spines is implanted, which is 0,45 mm. long and followed on the distal border by about a dozen similar spines, that gradually decrease in length, until near the antero-external angle of the uropod; the additional row of bristles that runs from this angle backward, is very short, 0,14 mm. long and diverges but little from the distal border. Inner uropod 1,1 mm. long, 0,52 mm. broad, twice as long as broad, obtusely rounded distally; as in *Call.* (*Cheramus*) *lobetobensis*, the nearest related species, at one-third of its length the anterior border is armed with a small, acute, immovable spine, between the basal joint and this spine the anterior border is glabrous; in front of the tip the anterior border bears a few movable

spinules. At a distance of 0,3 mm. from the base of this uropod on the upper surface a movable spinule is implanted, 0,21 mm. long, twice as far distant from the posterior as from the anterior border.

Eyestalks of the usual shape, as long as or a trifle longer than the basal joint of the antennular peduncle, with the inner margins contiguous till near the tips that are acute, outer borders arcuate; eyes black, small, not far from the tip, contiguous to the outer border.

Inner antennae 2,2 mm. long, about three-fourths the length of the carapace, the peduncle 1,24 mm. long, the longer flagellum 0,96 mm.; 2nd joint half as long as 1st or basal article, once and a half as long as thick; 3rd joint 0,6 mm. long, almost 3-times as long as 2nd, slender, 5-times as long as thick in the middle; thicker upper flagellum 0,8 mm. long, one-third longer than the 3rd joint of the peduncle and composed of 12 segments, of which the 1st or proximal one is longer than thick, all the following broader than long, except the terminal which is about thrice as long as thick. The lower thinner flagellum (Fig. 24*d*) measures 1 mm., one-fourth longer than the upper and consists of 13 segments, of which the 1st is longer than broad, the following as long as or little longer than thick, the 11th or antepenultimate almost, the 12th just twice as long as thick, the terminal segment 0,14 mm. long, slender, 6- or 7-times as long as thick.

Antennal peduncle a trifle longer than that of the inner antennae, scaphocerite represented by a small acute spine, 0,1 mm. long; penultimate joint 0,56 mm. long, 0,1 mm. thick in the middle, 5-times as long as thick and reaching to the middle of the 3rd joint of the antennular peduncle; terminal joint 0,38 mm. long, two-thirds the length of the preceding; flagellum incomplete.

The external maxillipeds (Fig. 24*e*), that much resemble those of *Call.* (*Cheramus*) *pugnatrix*, to which *Call. pygmaea* is closely related, are pediform and narrow. Ischium 2,3-times as long as broad in the middle, presenting its greatest width, which is nearly half the length, near the base and hence slightly narrowing forward; outer margin slightly concave, inner slightly convex; merus quadrangular, unarmed, half as long as the ischium, nearly as long as broad, outer and inner borders slightly curved, the outer longer than the inner; antero-external angle rounded, antero-internal subacute, anterior distal margin oblique; propodus about as long as the merus, not expanded, twice as long as broad; dactylus conical, a little shorter than the propodus, almost 3-times as long as broad at its base.

The smaller cheliped (Fig. 24*f*) is placed at the left side. Ischium 1,1 mm. long, 0,26 mm. broad in the middle, 4-times as long as broad, slightly widening distally; upper border nearly straight, unarmed, lower a little concave and armed with four, slender, sharp spines of equal length, the two middle ones a little farther distant from one another than the rest; merus 1,06 mm. long, 0,42 mm. broad in the middle, nearly as long as the ischium, not longer, 2,5-times as long as broad; it has an oval shape, upper border unarmed, lower armed just behind the middle with a slender acuminate spine, which is half as long as the joint is broad in the middle. Carpus 1,6 mm. long, once and a half as long as the merus, slender, 4-times as long as broad; both margins unarmed, the upper straight, the lower from the distal extremity nearly to the middle barely, hence rather rapidly converging towards the upper border. Chela 1,75 mm. long, a trifle longer than the carpus; near the articulation of the fingers, where it shows the greatest width, the chela is 0,52 mm. broad, being 3,4-times as long as

broad; palm 0,7 mm. long, decreasing in breadth towards the proximal extremity, fingers about one-third longer than the carpus, gradually tapering to the pointed tips that cross one another, cutting-edges straight, without teeth; lower border of the chela straight, fringed with setae to the tip of the finger.

The 2nd legs show the usual form as in the other species of this genus. Merus 1,25 mm. long, presenting its greatest width of 0,4 mm. about at the proximal third; hence the merus decreases in width both proximally and distally, lower border S-like, fringed with long setae along the two proximal third parts; carpus 0,7 mm. long, little more than half as long as the merus, its width or breadth two-thirds the length; chela 0,9 mm. long, palm 0,3 mm., fingers, measured horizontally, 0,6 mm., palm 0,52 mm. broad; carpus and chela setose.

The legs of the 3rd pair (Fig. 24*g*) also much resemble those of *Call. pugnatrix*. Merus 1 mm. long, 0,34 mm. broad in the middle, 3-times as long as broad, carpus 0,8 mm. long, 0,34 mm. broad, a little more than twice as long as broad; propodus from the distal border to the obtuse tip of the posterior lobe 0,82 mm. long, as long as the carpus, half as broad as long; posterior lobe triangular, obtuse, rather small, its length measuring only one-fifth the whole length of the joint, lower border fringed with long setae, that are once — in the other specimen twice — interrupted on the distal half by a glabrous, slightly concave emargination; a movable spine, long 0,16 mm., is implanted at the distal extremity of the border; dactylus long 0,34 mm., almost half as long as the propodus, 3-times as long as broad at base.

Legs of the 5th pair cheliform. Merus 0,96 mm. long, 0,16 mm. broad, slender, 6-times as long as broad, carpus 0,65 mm. long, 0,2 mm. thick distally, measuring nearly two-thirds the length of the merus and 3-times as long as thick, chela 0,8 mm. long, fingers very short, 0,16 mm. long, one-fifth the length of the chela; chela 4-times as long as broad, presenting its greatest width at the finger-cleft, fingers concealed by a brush of long setae.

The pleopods of the 1st segment are uniramous, short, two-jointed filaments, 0,4 mm. long; the basal joint is very short, 0,07 mm. long, the other, 0,33 mm. long, almost 5-times as long, becoming broader distally and provided here with long setae; the pleopods of the 2nd pair are also narrow, but biramous filaments, those of the three following segments are lamelliform.

The nearest allied species of *Call. pygmaea* are *Call.* (*Cheramus*) *lobetobensis* de Man and *Call.* (*Cheramus*) *pugnatrix* de Man. It agrees with the former by the possession of a spine on the anterior border of the inner uropods and in the general shape of the external maxillipeds, of the smaller cheliped and of the 3rd legs; in *Call. lobetobensis* the antennal peduncle is, however, much longer than that of the inner antennae, there is a spine on the anterior border of the merus of the external maxillipeds and of the smaller cheliped, the telson is distinctly longer than broad, more deeply notched, etc. In *Call. pugnatrix* the antennal peduncle is also but a trifle longer than that of the inner antennae, but the segments of the lower thinner flagellum show a much more slender form, being much longer than thick; the rostrum has a different shape. The additional row of bristles on the outer uropod is also short, the uropods have nearly the same form, but there is no spine on the inner uropod and the telson appears, as in *Call. lobetobensis*, bilobed, longer than broad; the external maxillipeds present in *Call. pugnatrix* and *Call. pygmaea* nearly the same form.

Notwithstanding this resemblance in certain characters *Call. pygmaea* should, however, be referred with more right to the subgenus *Callichirus*, the telson being broader than long and much shorter than the uropods, so that this species furnishes again a proof of the relationship between this subgenus and the subgenus *Cheramus* and the artificialness of the characters by which the two are distinguished.

11. *Callianassa* (*Cheramus*) *moluccensis* de Man.

Pl. XVI, Figs. 25—25*a*; Pl. XVII, Figs. 25*b*—25*c*.

Callianassa (*Cheramus*) *moluccensis* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereeniging (2), Dl. IX, 1905, p. 606.

Stat. 231. Ambon. Reef. One male.

Unfortunately both legs of the 1st and of the 4th pair are wanting. Apart from these legs this specimen bears a very close resemblance to *Call.* (*Cheramus*) *indica* de Man. Together with the single specimen of the latter species it was sent by me to Dr. Calman of the British Museum, who informed me that this specimen from Ambon belongs also to another species than *Call. mauritiana* Miers from the Mauritius.

The male from the reef at Ambon is 60 mm. long; the carapace, 16,5 mm. long in the middle line, measures little more than one-fourth the length. The median rostral tooth (Fig. 25 and 25*a*) is broadly triangular like in *Call. indica*, but it is more advanced, sharper and extends to the level of the posterior margin of the eyes; the lateral teeth, between the eyeplates and the antennal peduncles, are as small as in *Call. indica* and rounded, so that the median tooth projects comparatively farther beyond them than in *Call. indica*.

For the rest the carapace and the abdominal segments agree nearly in both species. The telson (Fig. 25*b*), 6 mm. long and 6,6 mm. broad, resembles more that of *Call. mauritiana* (E. J. Miers, in: Proc. Zool. Soc. 1884, Pl. I, Fig. 2), because it is a little broader in proportion to its length and because the lateral margins converge somewhat less backward than in *Call. indica*; its proportion to the 6th segment is, however, as in the latter species. The uropods resemble closely those of *Call. indica*, but they reach a little farther beyond the telson, when directed backward, and a small, sharp spinule is placed on the proximal end of the posterior rib of the outer uropod, just near the basal joint.

The eyestalks show a different form from those of *Call. indica* and *Call. mauritiana*. They are a little shorter in proportion to the breadth of their base than those of *Call. indica* and they do not yet reach to the distal end of basal antennular article; the eyestalks are namely 1,55 mm. long and 1,33 mm. broad at their base, whereas those of *Call. indica* are 3,2 mm. long and 2 mm. broad, the length being taken from the frontal border just inside of the lateral teeth. In *Call. indica* the inner margins are contiguous until near the tips; in the present species, however, they diverge gradually from the tip of the rostrum and curve regularly to the antero-external angle, which is sharp and slightly turned upwards and outwards. Three or four very short setulae occur on the upper surface near the inner border, but there are no teeth on the tip as are found in *Call. indica*. The oblique lateral border of each eyestalk runs S-like, appearing convex at the level of the eyes and concave between them and the antero-external angle. The distinctly faceted

and black pigmented, convex eyes are situated on the outer border of the stalks as in *Call. indica*, but they are comparatively larger and situated as far from the proximal end of the outer border as they are long and a little farther from the antero-external angle; in a lateral view the upper surface of the eyestalks slopes obliquely down as in *Call. indica* and it is flattened near the inner border and anteriorly.

The two pairs of antennae and the external maxillipeds resemble closely those of *Call. indica*.

The 2nd legs resemble also those of this species, but the chela, 5 mm. long, appears a little longer than the carpus, which is 4,5 mm. long and 2,5 mm. broad; the 3rd and the 5th legs also not differ from those of *Call. indica*.

The 1st pleopods (Fig. 25*c*) differ from those of *Call. indica*. They are as short as in this species, 3,4 mm. long, slender, uniramous and compressed; of the two lobes into which they terminate at their tip, the inner is obtuse, but the outer is hook-shaped, the hook being very sharp, reaching beyond the inner lobe and curved towards the inner side. The curved outer border of the hooky lobe is furnished with setae that are 2 mm. long and shorter, a tuft of similar setae is inserted on the middle of the outer border of the pleopod and some shorter hairs occur at the distal end and at the base of the obtuse lobe. The pleopods of the four following segments resemble those of *Call. indica*.

12. *Callianassa* (*Cheramus*) *indica* de Man. Pl. XVII, Figs. 26—26*g*.

Callianassa (*Cheramus*) *indica* J. G. de Man, in: Tijdschr. d. Nederl. Dierk. Vereeniging (2) Dl. IX, 1905, p. 605.

Stat. 16. March 15/16. Lat. 6° 59′ S., long. 115° 24′.7 E. Bay of Kankamaraän, South coast of Kangeang. Reef. One male.

A better proof that the littoral Crustacea of the Indian Archipelago are still insufficiently known, could not be furnished than by the discovery of a new *Callianassa* of large size in the Java Sea! Unfortunately only one specimen was collected, in which one cheliped, probably the larger, is wanting. It was therefore impossible to decide whether this specimen might be referred or not to *Call. mauritiana* Miers (in: Proc. Zool. Soc. London, 1882, p. 341 and 1884, Pl. I, fig. 2) from the Mauritius, as was at first supposed because the caudal fan agrees much with Miers's figure. In the quoted description indeed nothing is said about the legs except the larger cheliped, nothing about the external maxillipeds nor about the two pairs of antennae. This specimen was therefore sent to Dr. Calman of the British Museum, who, having compared it with the two type specimens (♂ ♀) of *Call. mauritiana*, informed me that the *Callianassa* from the Java Sea belongs to a distinct species, for which information I am much obliged to him.

Call. (*Cheramus*) *indica* presents also a close relationship to *Call.* (*Cheramus*) *pachydactyla* A. M.-Edw. from the Cape Verde Islands (Nouv. Archives du Muséum, Mémoires T. VI (1870), p. 86, Pl. II, fig. 1).

The male from Kangeang reef is 90 mm. long, carapace 23 mm., abdomen 67 mm. The carapace that measures one-fourth the whole length, resembles that of *Call. pachydactyla* (l. c. fig. 1*a*), but it is less prominent anteriorly. The anterior border of the carapace, indeed, (Fig. 26*a*) is feebly advanced in the midline between the eyestalks and at each side of them;

the median rostral tooth is broadly triangular and subacute, the lateral teeth, situated between the eyestalks and the antennal peduncles, are also triangular, but less broad, rather obtuse and project still less forward than the median tooth. The median tooth presents a transverse row of four small puncta, in which short setulae are inserted, and appears for the rest smooth; the lateral teeth are a little concave and also a little pubescent, the setulae are implanted in small puncta, only perceptible, like those on the median tooth, by means of a magnifying glass. The gastric region is oval, 17,5 mm. long, from the median rostral tooth to the cervical groove which is as deep as in *Call. pachydactyla*, and extends thus along three-fourth parts of the length of the carapace; strongly convex transversely the gastric region appears also slightly curved longitudinally. The upper surface presents posteriorly, on each side, near the cervical groove two rather large puncta, situated behind one another; one observes, nearer to the middle line, at either side a longitudinal row of much smaller puncta on the posterior half and in all these puncta microscopical setae are implanted. For the rest the gastric region is quite smooth and shining. Branchial regions almost smooth, barely punctate. *Lineae thalassinicae* distinct.

The triangular first segment of the much depressed abdomen is nearly as long as the 2nd, the 3rd is a little shorter, the 4th a little shorter than the 3rd, but the 5th is again as long as the 2nd. The abdomen broadens gradually from the anterior end of the 1st segment to the 6th, but the 6th (Fig. 26*c*), that is a little longer than the preceding segments, is less broad than the 5th. The tergum of the 1st segment presents at each side a few large puncta, a few occur also on the 2nd laterally and on the 3rd—5th one observes a large irregular pit that separates the terga from the pleura; the pleura of these segments bear a tuft of hairs, on the 3rd posteriorly, on the 4th in the middle, on the 5th anteriorly. The 6th segment is transversely grooved on each side, about at one-third its length from the posterior margin; the grooves divide the lateral borders in a larger anterior and a shorter posterior part. The lateral margins of the posterior part bear a tuft of setae, a few are implanted near the inner end of the transverse grooves and the posterior border bears two tufts of setae on each side of the middle line.

The caudal fan much resembles that of *Call. pachydactyla* (l. c. Pl. II, fig. 1*e*). The telson measures nearly two-thirds the length of the 6th segment; the distance between its anterior and its posterior border measures 9,5 mm., whereas it shows its greatest breadth of 10 mm. at a little more than one-third its length from the anterior border. The telson is thus almost as broad as long. The antero-lateral angles are rounded; between them and there where the telson appears broadest, the lateral margins are slightly concave, which is not the case in *Call. pachydactyla*, according to the figure 1e of this species (l. c.). Behind the greatest width the lateral margins converge backward, appearing nearly straight and they finally curve into the posterior border which is slightly concave in the middle. The upper surface of the telson is vaulted in the middle, anteriorly until just behind the middle, and slopes obliquely down to the posterior border, appearing here a little concave; the vaulted portion extends to nearly midway between the middle line and the lateral margins, the lateral parts of the surface being flattened at each side. The telson is fringed posteriorly with setae and a small tuft of setae exists in the middle line on the posterior part of the vault.

The telson of *Call. mauritiana* is comparatively broader, almost one and a half

times as broad as long and also that of *Call. pachydactyla* appears a little broader than in *Call. indica*. In *Call. pachydactyla* the lateral borders are more regularly curved and the notch in the middle line is deeper, in *Call. mauritiana* the posterior margin is nearly straight and makes distinct angles with the lateral borders.

The basal joint of the uropods is unarmed and divided by a transverse groove in a larger anterior and a smaller posterior portion; in *Call. pachydactyla* the anterior portion appears smaller than the posterior. The inner uropod, directed backward, reaches just as far as the telson. It resembles that of *Call. pachydactyla*, but appears a little less broad in proportion to its length; this uropod is namely 7 mm. long and 7,75 mm. broad, little broader than long. The posterior or distal border is nearly straight, the anterior slightly curved proximally and the angle between both is rounded; the slightly arcuate, inner border passes also by a curve into the posterior. The anterior border is somewhat thickened and a straight prominent rib runs down the middle of the joint, reaching almost to the distal margin. That part of the upper surface which is situated between the rib and the anterior border, is somewhat uneven; a small tuft of setae occurs at the distal end of the rib and the apical border is fringed with setae. The inner uropod of *Call. mauritiana* has a quite different form, it is longer than broad, the anterior border is straight and makes a distinct angle with the posterior.

The shape of the outer uropod is the best perceptible on its lower surface, it appears then triangular, the slightly curved anterior border appears much shorter than the rounded distal margin and also somewhat shorter than the undulate inner. The outer uropod is 11,5 mm. long and 11 mm. broad; extended backward, it reaches a little beyond the telson. The thickened anterior border and the anterior of the two ribs that run down the middle, are united distally by a transverse ridge which is fringed with setae like the distal border; the posterior rib is narrower and curves distally backward. In the figure of *Call. pachydactyla* the outer uropod presents a somewhat different form, the ribs are not drawn at all, perhaps, however, this figure is inaccurate; the figure of *Call. mauritiana* agrees better with our specimen.

The eyestalks are characteristic (Fig. 26*a*, 26*b*). Measured in the middle line of the body they appear to be 2,5 mm. long from the tip of the rostrum to their anterior extremity and they are together 4 mm. broad at their base. In a lateral view their upper surface which is somewhat flattened or slightly concave on the proximal half, appears to slope obliquely down, whereas the lower extends horizontally forward. Each eyestalk is thus a little longer than broad at its base and appears triangular; the straight inner margins are contiguous until the tip, whereas the lateral borders converge distinctly forward. The rounded tips of the stalks are beset with four or five small teeth or tubercles, recognizable by means of a magnifying glass; one of them, near the outer angle, an obtuse tooth, is larger than the rest and directed obliquely outward. The shining black-pigmented eyes that do not seem to be faceted, are small, somewhat convex and situated on the outer border of the stalk, just midway between the base and the tip; behind the eyes the lateral border is straight, in front of them a little concave, and the narrowed distal part of the stalk is flattened and compressed. Viewed at from above the eyes appear distinctly farther distant from the inner border of the stalk than they are broad. The eyestalks of *Call. mauritiana* are different, as Dr. CALMAN wrote me: the eyes indeed are here situated closer by the tip of the stalks and are a little remote from the lateral border.

The internal antennae are 21,5 mm. long, nearly as long as the carapace, whereas the peduncle, 7 mm. long, appears half as long as the lower flagellum. The 1st joint, that reaches just as far forward as the eyestalks, is 2 mm. long and just as broad at the base, whereas it is but little less broad distally; the 2nd joint is just as long as the 1st, looked at from the lower side of the body, but only 1,5 mm. thick; the 3rd joint, 3 mm. long, is one and a half times as long as the 2nd and tapers to the distal end, so that this joint, 1 mm. broad in the middle, proves to be 3-times as long as broad. The 2nd and the 3rd joint are furnished on their outer border with long hairs. The lower flagellum, composed of 40 segments, is 2,5 mm. longer than the upper.

The external antennae are 39 mm. long, almost twice as long as the inner; the slender peduncle, 11 mm. long, projects by nearly two-thirds the terminal joint beyond the antennular peduncle, the penultimate and the terminal are nearly of equal length.

The external maxillipeds (Fig. 26*d*) resemble closely those of *Call. pachydactyla*. The ischium is nearly 7 mm. long; it widens a little distally, so that it proves to be 5,5 mm. broad at a distance of 2 mm. from the distal border, which is 5 mm. broad and articulates with the merus; the outer border of the ischium, which is little longer than broad, is straight, the inner somewhat curved and fringed with setae. The triangular merus is 4,25 mm. long, i.e. the length of the perpendicular from the tip to the posterior margin that articulates with the ischium; just in front of this margin it presents its greatest width of 5,75 mm., so that this joint appears one and a half times as broad as long; the outer margin is rather much curved. The carpus is 4,5 mm. long and 3,25 mm. broad, just beyond the middle. The propodus is 4,4 mm. long and 4 mm. broad; the lower margin of this joint, which is greatly dilated and as long as broad, is semicircular and fringed with hair. Dactylus almost as long as the propodus. The external maxillipeds of *Call. mauritiana* are narrower and their propodus is almost twice as long as broad.

The right leg of the 1st pair, probably the larger, is wanting, but Dr. Calman sent me a sketch of the smaller cheliped of the male type specimen of *Call. mauritiana* and informed me that it is very different from that of *Call. indica*. This cheliped (Fig. 26*e*), all the joints of which are unarmed, resembles apparently more the smaller cheliped of *Call. pachydactyla*. The compressed ischium is 10,5 mm. long; it is 2,4 mm. broad in the middle and, broadening a little distally, 3,8 mm. at the distal end, which articulates with the merus; the ischium is thus nearly 4-times as long as broad. The merus is oval, 9 mm. long, a little shorter than the ischium and, being 5,8 mm. broad in the middle, appears one and a half times as long as broad. The inner surface is flattened, the outer somewhat convex transversely and also somewhat longitudinally, both margins are a little curved. Measured along the straight, upper border the carpus proves to be 7,25 mm. long, somewhat shorter than the merus; it is 6,4 mm. broad or wide distally, and, the carpus being 6 mm. long in the middle midway between the upper and the lower border, it appears here nearly as broad as long. Measured to the tip of the immobile finger the chela proves to be 17 mm. long, almost twice as long as the merus; the palm, which is 9 mm. long, a little longer than the carpus, measured along its upper margin, but one and a half times as long as it, when measured in the middle, appears proximally just as broad or high as the carpus and

narrows a little distally, as in *Call. mauritiana*, so that it is 5,75 mm. broad at the level of the articulation of the fingers. The outer surface of the palm is somewhat convex transversely, a little also longitudinally and the inner surface is also slightly convex. The distal border of the outer surface appears just above the tapering immobile finger finely denticulate and the tip of this finger is slightly turned upward; the likewise tapering dactylus is distinctly somewhat curved and a little longer than the fixed finger, so that the palm, though a little longer than the latter, appears just as long as the dactylus. Both the upper and the lower margin of the palm are faintly carinate or sharp proximally and those of the carpus are also ridged. The fingers are not toothed at all. The lower margin of the merus is fringed with setae and both the upper and the lower margins of carpus and palm are beset, on the inner surface of these joints, with small tufts of setae, a few occur also near them on the outer side. Tufts of setae on the fingers as usual. The carpus of the smaller cheliped of *Call. mauritiana* is considerably longer than the palm and has a much slenderer form, 4-times as long as broad (J. G. DE MAN, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach, 's Gravenhage 1928, Pl. II, fig. 4*c* (Capita Zoologica, Deel II, Afl. 6)).

On the figure 1*g* (l. c.) of the 2nd legs of *Call. pachydactyla* the chela appears a little longer than the carpus, in *Call. indica*, however, the carpus is a little longer than the chela; as regards the shape of these joints and of the merus, *Call. indica* agrees with that figure. The merus of the 2nd legs is 11 mm. long and, in the middle, 4,25 mm. broad; the carpus is 7,5 mm. long and 3,8 mm. broad; the chela 6,4 mm. long and just as broad as the carpus.

The 3rd legs apparently also agree with those of *Call pachydactyla*. The merus, 10,5 mm. long, is 3,2 mm. broad in the middle, a little more than 3-times as long as broad; the carpus, 8 mm. long, is 3,5 mm. broad distally. The distal end of the upper border of the propodus is a little more than one and a half times as far distant from the carpal articulation as the latter from the proximal end of the lower border, so that the rounded posterior lobe is but little shorter than the rest of the propodus; the distance between the distal end of the upper border and the proximal margin of the rounded lobe is 6,25 mm. long and this distance is just twice as large as the greatest breadth of the propodus; the slightly concave, lower margin is beset with tufts of setae and the posterior border of the lobe, as usual, fringed with longer setae. The flattened dactylus is 2,75 mm. long and 1,6 mm. broad, its borders are fringed with hairs, like the upper border of the propodus.

The legs of the 4th pair and the subcheliform legs of the 5th apparently agree with those of *Call. pachydactyla* and present nothing remarkable. The sternal plaque is funnel-shaped; the two narrow lateral walls, that are concave externally, diverge anteriorly and the interspace between them is filled up anteriorly by a rounded prominence that narrows between the legs of the 4th pair.

The 1st pleopods (Fig. 26*f*) are short, slender, compressed and become somewhat broader towards the distal extremity, which by a notch in the middle is divided into two rounded lobes (Fig. 26*g*), that are fringed with long setae. The pleopods of the 2nd segment are biramous, the rami foliaceous, narrow, the exopodite a little longer than the endopodite, on which no stylamblys was observed. The pleopods of the three following segments are much larger, biramous, the

rami foliaceous, the exopodite rather narrow, somewhat scythe-shaped and longer than the triangular, obtusely-pointed endopodite, which is broadly attached to the peduncle and furnished with a very small stylamblys, a little nearer to the proximal than to the distal end of the inner border. These pleopods resemble much those figured by Boas (Studier over Decapodernes Slaegtskabsforhold, 1880, Tab. V, fig. 177), but the exopodite is more pointed. According to Ortmann (in: Zoolog. Jahrbücher, VI, Syst. 1891, p. 48) the 3rd—5th pleopods of *Callianassa* should bear no stylamblys, but according to Borradaile (in: Annals Magaz. Nat. Hist. 1903, p. 544) it should be present.

Call. (*Cheramus*) *Jousseaumei* Nobili from the Red Sea is certainly the nearest related species. At my request Dr. A. Borelli of the Zoological Museum at Turin kindly sent me five type specimens of Nobili's species, of which the two largest are 60 mm. and 56 mm. long; in the latter specimen both legs of the anterior pair are present and one smaller cheliped is lying loose in the bottle. After a scrupulous examination I could detect only two essential differences. In the first place do the 1st pleopods (Pl. XVIII, Fig. 27*a*) of the male of *Call. Jousseaumei* present a different form, for they resemble those of *Call. moluccensis* (Fig. 25*c*): of the two lobes into which the second segment terminates the inner is obtuse, rounded, the other broader one is hook-shaped, the hook very sharp, reaching and curving beyond the inner lobe to the inner side. The other difference is presented by the external maxillipeds. In *Call. indica* the length of the merus measures two-thirds that of the ischium, the length and breadth of the merus are in proportion as 3 : 4, those of the ischium as 5 : 4; in *Call. Jousseaumei* (Pl. XVIII, Fig. 27), however, the length of the merus is in proportion to that of the ischium as $2 : 3^2/_3$, the length and breadth of the merus are in proportion as $3 : 3^1/_2$ and those of the ischium as $5 : 3^3/_{11}$. In *Call. indica* the penultimate joint appears as long as broad, in *Call. Jousseaumei* distinctly longer than broad. These maxillipeds are therefore in *Call. Jousseaumei* less broadened, more pediform than in *Call. indica*, both the ischium and the merus less broad in proportion to their length, the merus, finally, a little shorter in proportion to the length of the ischium. For the rest the two species resemble one another closely, even in minute details, so e. g. are the tips of the eyestalks armed with small teeth, as in *Call. indica*. The smaller cheliped presents the same shape and characters, perhaps will the larger, which in the single type of *Call. indica* is wanting, prove to show differences: this must be left to later researches.

13. *Callianassa* (*Trypaea*) *amboinensis* de Man. Pl. XVIII, Figs. 28—28*c*.

Callianassa amboinensis J. G. de Man, in: Archiv f. Naturg. 53. Jahrg. Berlin 1888, p. 480, Taf. XX, fig. 4.
Callianassa amboinensis L. Zehntner, Crustacés de l'Archipel Malais, Genève 1894, p. 194, in: Revue Suisse de Zoologie, T. II.
Callianassa (*Calliactites*) *amboinensis* L. A. Borradaile, in: Annals and Magaz. of Nat. Hist. Ser. 7, vol. XII, Nov. 1903, p. 545.

Stat. 133. July 25/27. Anchorage off Lirung, Salibabu-Island. Reef. One egg-bearing female.

Both the type, a female, from the Museum of Göttingen and a female without eggs, long 21 mm., also from Amboina and described by Zehntner, are lying before me. I am much

obliged to Prof. Bedot of Geneva for having sent me this specimen which is provided with both legs of the 1st pair.

This species was wrongly referred by Dr. Borradaile (l. c.) to the subgenus *Calliactites*, in consequence, of course, of the unsatisfactory original description of the 3rd legs: it is, indeed, a true *Trypaea*, according to that author's diagnosis.

The female from Salibabu Island, though already egg-bearing, is somewhat smaller than the type from Amboina, which measures, like that of Zehntner, 21 mm. from tip of rostrum to end of telson (in the original description erroneously 25 mm. were indicated as the length): the present specimen measures, indeed, only 17 mm. The carapace, rostrum included, is 3,65 mm. long, the abdomen 13,5 mm.; the carapace measures a little more than one-fourth the length of the abdomen. The rostrum (Fig. 28) is triangular, the tip not very sharp, its lateral margins somewhat concave and it measures only one-third the length of the 1st joint of the antennular peduncle. Just near the lateral angle of the eyestalks the lateral margins of the rostrum are notched; the notch is semicircular, small, 0,04 mm. deep and a short seta is implanted in it. *Lineae thalassinicae* distinct. The cervical groove is deep, the distance between the transverse posterior part of the groove and the posterior margin of the carapace measures one-fourth the length of the latter.

First segment of abdomen saddle-shaped, broader posteriorly than anteriorly, 1,6 mm. long. Second segment 2,7 mm. long, much longer than the others, about as long as the 3rd and 4th taken together, a little broader posteriorly than anteriorly. Third segment 1,7 mm. long, almost two-thirds of 2nd, 4th 1,3 mm. long, half as long as 2nd, the shortest of all; 5th 1,5 mm. long, longer than 4th, but shorter than 3rd, just as in other species. The 6th segment, 1,9 mm. long (Fig. 28*a*), measures two-thirds of 2nd, but is longer than the other segments; it is 2,36 mm. broad, broader than long. The telson is 1,56 mm. long and anteriorly 1,56 mm. broad, being just as long as broad; the somewhat convergent lateral margins curve regularly into the posterior border (Fig. 28*b*), that is a little concave in the middle and bears here a microscopical acute tooth, 0,02 mm. long, that not reaches beyond the posterior margin. Just there where the lateral margins curve into the posterior they carry a very small, movable spinule, only 0,04 mm. long; this spinule is 0,5 mm. distant from the median posterior tooth and the two spinules are 1 mm. distant from one another. The telson is fringed posteriorly with short, ciliated setae, 0,1—0,16 mm. long and it carries on each side a tuft of long plain hairs, the longest of which measure 1,3 mm. The upper surface carries in the middle a transverse row of long setae as usual and near the lateral borders 3 or 4 small tufts of hair, the foremost of which are 0,5 mm. long; there is also a small tuft of shorter hairs between the median row and the lateral margins.

The uropods are very short, extending but little beyond the telson, when directed backward; basal joint rounded anteriorly and posteriorly, unarmed. The inner uropod is oval, 1,8 mm. long, 1,08 mm. broad, presenting its greatest width just in the middle, rounded distally, with regularly arcuate anterior and posterior border; the length is in proportion to the breadth as 5 : 3. The barely prominent midrib bears two small movable spinules, 0,06 mm. long, the proximal one at one-third the length of the uropod from its base and somewhat nearer to the anterior than to the posterior border, the other about at one-third the length of the plate from

the distal extremity and somewhat closer by the posterior than by the anterior margin. There are a few short hairs on the upper surface except near the inner border. The inner uropod is fringed with plumose, articulated hairs, which at the tip are 0,5 mm. long; at the rounded tip and near the distal end of the inner border some plain setae are implanted that are a little longer. The outer uropod is just as long as the inner viz., 1,8 mm., but it is but one-fifth longer than broad, the greatest width being 1,5 mm. The anterior border of this uropod is nearly straight, but the rounded apical border and the arcuate inner form a regular curve, so that this limb appears nearly circular; it is fringed, as in the other species, with articulated plumose setae, on the apical border moreover with unjointed, plumose, stiff setae, nearly 0,7 mm. long, and it is armed at the inner side of the apical border with slender spines that are slightly curved forward. The antero-external angle is obtuse; the additional row of bristles near it is short, barely longer than one-third the width of the uropod and it diverges rather much from the apical border. There is a short spinule on the upper surface, 0,06 mm. long, inserted between the additional row of bristles and the basal joint, a little nearer to the former than to the latter and as far distant from the anterior border as from the additional row of bristles. The abdomen is smooth above, not carinate.

The 1st and 2nd pleopods are slender filaments, the former uniramous, those of the 2nd pair biramous; the three following pairs are foliaceous, the stylamblys short, 0,23 mm. long and half as thick, half its outer margin being supplied with cincinnuli; the stylamblys is twice as far distant from the base of the endopodite as it is long.

Eggs globular, diameter 0,44—0,46 mm. broad.

The eyestalks that are 0,8 mm. long and at their base 0,4 mm. broad, project with their acute apices which are turned outward, just beyond the distal extremity of 1st antennular article; the inner border of the stalks curves outward, immediately beyond the level of the cornea and the outer border of the triangular terminal part is slightly concave. The distinctly faceted cornea is situated on the outer side just behind the triangular terminal part of the stalk and in the present specimen the black spot of pigment is situated, apparently, a little distant from the outer border, whereas in the type from Amboina it is contiguous to it as shows my figure 4, l. c., Pl. XX. In the type the tips of the eyestalks are directed forward, because the inner border runs straight forward almost as far as the tip: these are probably individual differences.

The internal antennae are 3,5 mm. long, a little shorter than the carapace; the peduncle measures 2,34 mm., the lower flagellum, 1,16 mm. long, is just half as long as the peduncle. The 2nd joint is 0,5 mm. long, two-thirds of the 1st; it is 0,21 mm. thick at the distal end, so that it appears a little more than twice as long as thick, though slightly tapering proximally. The 3rd joint bears at the upper inner side, at the distal extremity, a triangular prolongation and is 1,2 mm. long without this prolongation, but 1,38 mm. when it is included; the 3rd joint, which is $2^1/_2$-times as long as the 2nd, has a slender shape, being 7- or 8-times as long as thick; looked at from above this joint appears, indeed, to be 0,175 mm. thick at the base, 0,148 mm. in the middle and 0,16 mm. at the distal extremity. Both the 2nd and the 3rd joints are furnished below with long ciliated hairs. The

thicker upper flagellum, 1,14 mm. long and 0,12 mm. broad in the middle (looked at from above), is composed of 14 segments that are all broader than long except the 1st and the last. The 1st segment is 0,16 mm. long and 0,1 mm. broad distally; the 5th is 0,1 mm. long and 0,12 mm. broad, the 8th 0,07 mm. long and 0,115 mm. broad, one and a half times as broad as long, the terminal joint is 0,07 mm. long and 0,04 mm. thick at the base. This flagellum shows the greatest breadth in the middle and tapers more towards the distal than towards the proximal extremity. The lower flagellum, which is very little longer, measuring 1,16 mm., is 0,08 mm. thick at its base and in the middle and tapers regularly to the distal extremity; it is a little more than half as thick as the upper and consists of 16 segments; the proximal are as long as thick or nearly so, the 4th, e. g., is 0,08 mm. long and just as thick, the 10th is 0,06 mm. long and 0,066 mm. broad, the penultimate, however, 0,06 mm. long and 0,045 mm. broad, the terminal segment, finally, is slender, tapering forward, 0,12 mm. long and 0,032 mm. thick at its base. The flagella are consequently a little shorter than the 3rd joint of the peduncle.

The external antennae are 6,7 mm. long, almost twice as long as the carapace. Their peduncle which is 1,7 mm. long, extends to the middle of the 3rd joint of that of the inner antennae; the 2nd joint bears above a very small, pointed scale, only 0,08 mm. long and about as broad; the 4th joint is 0,7 mm. long and less thick than the 2nd antennular article, the last joint, finally, 0,4 mm. long, 0,12 mm. thick, is little more than half as long as the 4th; the flagellum is 5 mm. long and composed of 45 segments.

The external maxillipeds are operculiform, the ischium and the merus being considerably expanded, the three last joints narrow. Measured in the middle the ischium proves to be 1,25 mm. long and, when measured along its straight, somewhat oblique anterior margin, 1,72 mm. broad; this joint, which is one and a half times as broad as long, has a slightly arcuate, inner border and a rounded postero-internal angle. The merus is 0,86 mm. long, 1,7 mm. broad; whereas it appears almost as broad as the ischium, its length is but two-thirds that of this joint; its outer margin is a little arcuate, anteriorly it is emarginate for the insertion of the carpus and the inner border is also curved. The carpus is 0,68 mm. long, 0,4 mm. thick distally, more than half as broad as long. The penultimate joint, 0,7 mm. long, as long as the carpus, presents its greatest width of 0,4 mm. at one-third its length from the carpal articulation, being little more than half as broad as long. The dactylus is finger-shaped, 0,41 mm. long, 0,17 mm. thick, little more than twice as long as thick and barely tapers towards the obtuse extremity. The inner margin of ischium and merus are fringed with ciliated setae of unequal length, the longest measuring 0,7 mm., much shorter than the breadth of these joints; similar setae occur on the other joints, those of the dactylus are shorter. The inner surface of the ischium carries a S-shaped row of 20 sharp teeth, that are rather small, when compared with those of other species; the row is 1 mm. long, situated at one-third the width of this joint from its outer margin and, as in other species, curves outward at its proximal end. Between this row of teeth and the outer margin the inner surface is somewhat hairy. The inner surface of the merus is also hairy on its outer half, but the row of hairs in the middle, that occurs in other species, is very short, rudimentary; on the three last joints the row of hairs on their inner surface is well-developed.

There is only one leg of the 1st pair, on the left side. This leg, the fingers of which are broken off, agrees with that which has been figured in my description of 1888 and which is the smaller one, as has been already remarked by ZEHNTNER (l. c.). Measured in the middle, the ischium appears to be 1,64 mm. long; it is 0,48 mm. broad in the middle, 0,7 mm. at the distal extremity, $3^1/_2$-times as long as broad; the lower margin bears on its distal half three very small, obtuse teeth. The oval merus, 1,62 mm. long and 1,12 mm. broad in the middle, is just as long as the preceding joint and one and a half times as long as broad. The arcuate upper border presents some distantly placed hairs, the longest at the distal end being 0,56 mm. long; the lower border which is quite unarmed, carries also some short hairs. The carpus is 1,24 mm. long and just as broad, the palm is 1,26 mm. broad.

The merus of the left leg of the 2nd pair is just half as broad as long, viz., 1,76 mm. long, 0,88 mm. broad, the carpus is 1,2 mm. long, 0,71 mm. broad; the chela is 1,4 mm. long, the palm 0,5 mm., the fingers 0,9 mm. and the palm, which is 0,65 mm. broad, is distinctly less broad than the carpus and the carpus less broad than the merus. The fixed finger bears 8 small teeth on the proximal half of its cutting-edge. In my original description (l. c. p. 482) the 2nd legs are erroneously described as resembling those of *Call. pachydactyla* (A. MILNE-EDWARDS, Nouv. Archives du Muséum, Mémoires, T. VI, Pl. 11, fig. 1*g*).

The merus of the 3rd legs (Fig. 28*c*) is almost half as broad as long, viz., 1,64 mm. long and 0,76 mm. broad, and presents its greatest width just in the middle; the carpus is 1,5 mm. long, 0,76 mm. broad, half as broad as long. The propodus has a rather irregular shape. Measured between the carpal articulation and that of the dactylus it proves to be 1 mm. long, but the distance between the rounded extremity of the posterior lobe and the distal end of the strongly curved upper margin measures 1,12 mm.; in the middle of this direction the propodus presents its greatest width of 0,78 mm., appearing then one and a half times as long as broad. The rounded lobe on the hinder edge is rather short, 0,14 mm. long, one-eighth the length of the propodus in this direction; as in other species a spine, 0,16 mm. long, occurs near the distal end of the lower margin and, posterior to it, this margin is twice emarginate, the notches being rather broad and shallow. The conical pointed dactylus is 0,6 mm. long, 0,2 mm. thick at its base, 3-times as long as thick.

Measured in the middle the merus of the 4th legs proves to be 1,7 mm. long, in the middle 0,74 mm. broad, nearly half as broad as long. The carpus is 3-times as long as broad, 1,5 mm. long, 0,5 mm. broad. The penultimate joint is rectangular, 1,3 mm. long, a little shorter than the carpus; this joint, the lateral margins of which are straight, narrows somewhat distally, being 0,44 mm. broad near the carpal articulation, 0,42 mm. in the middle and 0,3 mm. at the distal end; a straight spine, 0,34 mm. long and denticulate on its distal half, occurs at the distal end of the lower margin. The pointed dactylus is 3-times as long as thick, 0,64 mm. long and 0,2 mm. thick at its base.

The legs of the 5th pair are subcheliform. The merus, 4-times as long as broad, is 1,5 mm. long and presents its greatest breadth of 0,39 mm. not far from the distal end; the carpus is 3-times as long as thick, 1,3 mm. long, 0,45 mm. thick; the propodus is 1,5 mm. long until the tip of the fixed finger, 0,48 mm. broad distally and it is here immersed in a brush of hair; the dactylus, finally, is curved, longer than the immobile finger.

The following remarks about the type specimen of *Call. amboinensis*, a female from Amboina, described (l. c.) in 1888, will, I suppose, be welcome. Something concerning the length of this specimen and the form of the eyestalks has already been observed.

Looked at from above the 2nd joint of the antennular peduncle appears to be 0,53 mm. long and at the distal extremity 0,31 mm. thick; the 3rd joint is 1,4 mm. long, somewhat more than $2^1/_2$-times the length of the 2nd, the triangular prolongation at the distal end excluded, and 7-times as long as thick, being 0,23 mm. thick at the proximal, 0,2 mm. at the distal extremity and in the middle. The thicker flagellum, composed of 22 segments, is 1,5 mm. long, a little longer than the 3rd joint of the peduncle, but, when the distal prolongation of the latter is included, it appears to be 1,6 mm. long, slightly longer than the flagellum. The 1st segment of the thicker flagellum is 0,22 mm. long and 0,12 mm. thick distally, almost twice as long as thick; the following segments, however, are all considerably broader than long, except the last one. So e. g. is the 5th segment 0,08 mm. long, 0,13 mm. broad, the 8th 0,072 mm. long, 0,15 mm. broad, the two following present the same measurements and the flagellum presents thus here, in the middle, its greatest breadth of 0,15 mm.; the conical terminal segment is 0,08 mm. long and 0,04 mm. thick at its base. The other flagellum is a little longer, viz., 1,64 mm. and tapers regularly to the tip. It is composed of 23 segments, the 1st, 0,16 mm. long, is 0,095 mm. thick at the distal end and longer than thick; the 4th is 0,1 mm. long and 0,105 mm. thick, the 10th 0,06 mm. long and 0,095 mm. broad, broader than long, the penultimate 0,066 mm. long and 0,05 mm. broad, longer than thick, the last segment, finally, is conical, 0,13 mm. long and 0,04 mm. thick at its base. In the middle of this flagellum the segments are slightly broader than long, but they grow longer towards both extremities.

The ischium of the external maxillipeds, measured as has been indicated above, is 1,45 mm. long and anteriorly 1,8 mm. broad, the merus 1 mm. long and just as broad as the ischium. The carpus is 0,8 mm. long and 0,47 mm. broad distally, the propodus also 0,8 mm. long, its greatest width is 0,54 mm., the dactylus 0,53 mm. long, 0,22 mm. broad. The teeth on the inner surface of the ischium are 20 in number, all very acute, except 4 or 5 small teeth at the proximal end of the row; the foremost tooth is larger than the rest.

The tip of the rostrum appears in the type rather sharp, sharper than in the female collected by the Siboga-Expedition.

As is proved by the third specimen lying before me, the female from Amboina, which l. c. was described in 1894 by Zehntner, the detached cheliped of the type is indeed the smaller one, on account of the shape of the carpus. In the larger cheliped of Zehntner's specimen the carpus, measured in the middle of its outer surface, appears barely half as long as the palm and it appears also shorter in proportion to its width than in the smaller cheliped. In Zehntner's female, the chela of the smaller cheliped appears comparatively smaller than that of the type specimen, the fingers have a slenderer form and are longer, almost as long as the palm. The chela of the smaller cheliped of the type resembles more that of the larger cheliped of Zehntner's specimen. These are, no doubt, individual differences.

Geographical distribution: Amboina (de Man, Zehntner).

14. *Callianassa* (*Callichirus*) *placida* de Man.

Pl. XVIII, Figs. 29—29*b*; Pl. XIX, Figs. 29*c*—29*e*.

Callianassa placida J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging (2) Dl. IX, 1905, p. 612.

Stat. 58. April 25. Anchorage off Seba, Savu. Reef. One male.
Stat. 142. August 5/7. Anchorage off Laiwui, coast of Obi Major. Reef. One female without eggs.

A new species intermediate in its characters between *Call.* (*Callichirus*) *Martensii* Miers and *Call.* (*Callichirus*) *mucronata* Strahl.

The larger specimen, that from the reef at Obi Major, is 30,5 mm. long, the carapace (rostrum included) 6,8 mm., the abdomen 23,7 mm., the former measuring almost one-third the length of the abdomen. *Lineae thalassinicae* distinct. Cervical groove strongly defined, its distance, 1,34 mm., from the posterior margin one-fifth the length of the carapace. Anteriorly the carapace (Fig. 29) is trispinose, as in *Call. Martensii* and *Call. tridentata*. The median spine or rostrum, flattened above and gradually narrowing to the pointed tip, extends somewhat beyond the middle of 1st antennular article, being 0,85 mm. long; it is a little shorter than the eyestalks, reaching to the last fifth part of their length, i. e. to the corneae. The acuminate lateral spines, between the eyestalks and the antennal peduncle, are 0,33 mm. long, two-fifths the length of the median spine and reach almost to the distal extremity of 1st antennular article. The median spine carries at its base near the lateral margin a small tuft of setae and a few small tufts of setae are observed on the anterior part of the gastric region.

Carapace and abdomen smooth above, not carinate. First abdominal tergum, 3,5 mm. long, a little longer than broad and somewhat broader posteriorly than anteriorly. The 2nd and the 6th segment are almost of equal length, about 4,25 mm. long, longer than the rest; the 2nd is posteriorly a little broader than long. The 3rd segment measures three-fourths of the 2nd; it is a little longer than the 5th and as in other species the 4th is the shortest of all. The terga are all flattened above from before backward, but the 6th segment (Fig. 29*a*) which is somewhat longer than broad, is strongly convex transversely and also somewhat longitudinally. The caudal fan much resembles that of *Call. mucronata* (vide J. G. de Man, in: Archiv f. Naturg. 53. Jahrg. 1888, Taf. XXI, fig. 2*a*). Telson as in this species, 2,6 mm. broad anteriorly, 1,6 mm. long, one and a half times as broad as long; the S-shaped lateral margins converge backward and the posterior border, the lateral angles of which are rounded, projects slightly in the middle. The upper surface is somewhat convex in the middle from before backward and flattened laterally; it bears just in the middle a transverse row of hairs and a small tuft of setae is found on the posterior border at either side of the middle line.

The uropods, both considerably longer than the telson, resemble those of *Call. mucronata*. The basal joint is smooth, flattened, rounded, unarmed. The outer uropod is triangular, a little longer than broad, rounded distally; anterior border straight, making a right angle with the distal border and somewhat shorter than the inner, which is also straight and which makes no angle with the distal border, different from *Call. Martensii*. Distal border fringed with feathered setae and armed with small spines that grow longer backward and that extend to the posterior extremity. Raised part of the upper surface triangular, its form slightly different from that of *Call. mucronata* and extending a little beyond the middle of the plate; its distal

margin slightly arcuate and fringed with setae and spines as in other species. Inner part of the upper surface, which is covered by the inner uropod, concave; a small spine at the base near the inner margin. Inner uropod lanceolate, half as broad as long, obtusely pointed; anterior border curved, posterior nearly straight; upper surface carinate longitudinally, the carina obtuse, running somewhat nearer to the inner than to the anterior border. There is a tuft of long setae near the middle of the inner or posterior margin.

In the male from Stat. 58, which is 18 or 19 mm. long, the small abdominal appendages of the 1st segment resemble those of *Call. mucronata*, their extremity that is furnished with many long setae, ending anteriorly in a rounded tip, posteriorly in a rather sharp-pointed, hooked tooth. The pleopods of the 2nd pair are biramous, the outer branch 6-times as long as broad, longer but somewhat less broad than the inner, both with a few short setae on the obtuse tips. The pleopods of the three following segments are foliaceous, stylamblys very short, 0,1 mm. long and just as broad, situated in the middle of the inner of the endopodite.

In the female the first pleopods are also as in *Call. mucronata*, but the terminal joint is more elongate, 1,8 mm. long, 7-times as long as broad. Those of the 2nd pair are biramous, moderately slender, furnished with long, plumose setae; outer branch slender, slowly narrowing to the obtuse tip, 2,2 mm. long, 8-times as long as broad in the middle; inner branch just as long, but one and a half times as broad as the other. The inner branch bears a slender stylamblys, 0,4 mm. long and almost 6-times as long as broad, on its inner margin not far from the obtuse tip, beyond which it extends almost by half its length; it carries cincinnuli at its distal end. The stylamblys of the foliaceous pleopods of the three following segments is very short, 0,26 mm. long, implanted about on the middle of the inner margin.

Eyestalks (Fig. 29) of the larger specimen 1 mm. long, reaching not yet to the distal end of 1st antennular article; they are rounded apically and are here little less broad than at their base; their outer border is somewhat concave, the inner margins that are almost contiguous, end distally in a short conical tooth, which is directed inward and reaches not so far forward as the rounded apex of the stalks. The eye with distinctly faceted cornea and a speck of black pigment occupies the distal third part of the stalks.

Inner antennae 6,26 mm. long, peduncle 2,46 mm., flagella 3,8 mm., the latter one and a half times as long as the former. Distance between the anterior border of the carapace and the distal end of 1st antennular article 1,06 mm. long; 2nd joint 0,6 mm. long and nearly half as thick. Third joint 0,88 mm. long, one and a half times as long as 2nd, slightly tapering distally when looked at from above and nearly 4-times as long as thick. The upper flagellum that measures 3,5 mm., appears in a lateral view to broaden gradually, though slowly, until one-fourth of its length from the extremity and hence tapering to the latter; in a lateral view this flagellum proves to be 0,15 mm. thick at its base and 0,21 mm. at the broadened part. It is composed of 26 segments; in a lateral view the first 6 or 7 segments appear to be somewhat longer than thick, the following are as long as broad and on the broadened distal part the segments are distinctly broader than long, except the terminal segment, which, twice as long as the penultimate, appears almost three times as long as thick at its base. The lower flagellum, 3,6 mm. long, is 0,13 mm. thick at its base in a lateral view and tapers very slowly to the extremity, being 0,12 mm. thick in the middle; the upper flagellum appears

therefore, in the middle, one and a half as thick as the lower. The lower flagellum, consisting of 20 segments, all longer than thick, is furnished, just as the peduncle, on its lower side with long ciliated hairs.

External antennae 18,3 mm. long, somewhat more than half as long as the body, the peduncle measuring 3,3 mm., the flagellum 15 mm. The peduncle reaches with two-thirds its terminal joint beyond the peduncle of the inner antennae; the three first joints are together 1 mm. long, the 4th 1,2 mm., the 5th 1,1 mm.; the two last subequal joints are slenderer than the antennular peduncle and there is apparently no trace of a small spine on the articulation between the 3rd and the 4th joint, as occurs in other species. The flagellum, just half as long as the body, is composed of 75 segments, that are almost all longer than thick.

The external maxillipeds (Fig. 29*b*) are characterized especially by the strong expansion of their penultimate joint. The ischium is 1,28 mm. long, measured in the middle, and 1,12 mm. broad in the middle, little longer than broad; outer and inner margins nearly straight, parallel. Merus indistinctly triangular; it is 1,2 mm. long, measured between the antero-external angle and the posterior margin; its greatest width, at one-third its length from the posterior margin, which, 1,02 mm. broad, articulates with the ischium, is just as large as the length. The outer border is very slightly curved; the more strongly curved, inner border makes almost no angle at all with the somewhat concave anterior, that is 0,65 mm. broad, less broad than the posterior. The carpus has the usual form, it is 1,4 mm. long and 0,88 mm. thick distally. Propodus strongly expanded, 1,24 mm. long, 1,16 mm. broad, almost as broad as long; upper (outer) margin nearly straight, lower regularly curved and passing into the somewhat sinuate distal border, without making an angle. The propodus is almost just as broad as the merus and a trifle broader than the ischium. The finger-shaped dactylus is 1 mm. long, 0,26 mm. thick in the middle, nearly one-fourth its length; it tapers slowly to the obtuse tip that ends in a distinct claw and that is surrounded by some stout bristles. The inner surface of the ischium bears the usual row of sharp spines, somewhat nearer to the outer than to the inner border and slightly curved; one observes, parallel with this row, between it and the inner margin a row of small tufts of hair. The inner surface of the merus bears also a series of spines or short stiff bristles, running from the carpal articulation as far as the middle of this joint. One observes on the middle of the inner surface of the propodus a row of transverse tufts of hairs; that which is situated nearest to the carpus, is much larger than the rest. The long hairs with which the joints are fringed, are distinctly ciliate.

The 1st legs much resemble those of *Call. mucronata*. In both chelipeds (Fig. 29*c*, 29*d*) the lower border of the ischium is armed with 7 or 8 spines; the first 4 or 5 are small, the following become rapidly longer. The merus has the same form as in *Call. mucronata*, that of the larger cheliped (Fig. 29*c*) has its lower border sharp and faintly serrate, without a large tooth or spine, of that of the smaller leg the lower border is entire. The carpus of the larger cheliped is 2,4 mm. long and 2,8 mm. broad near the articulation with the chela; this joint, little broader than long, is comparatively longer than in *Call. mucronata*. The larger chela is 6,25 mm. long, the palm is 3,7 mm. long and 3,1 mm. broad; the palm, one and a half times as long as the carpus, is, in the middle, a little broader than it and

distinctly longer than the fingers, that cross one another when closed. The dactylus is strongly curved, both fingers are pointed. The joints of this leg are glabrous on their outer surface, the lower border of carpus and chela is cristate and fringed on both sides with hairs, which, on the inner side, are more numerous and longer. Carpus and chela (Fig. 29*d*) of the smaller cheliped resemble closely those of *Call. mucronata*. The carpus is 2,6 mm. long, 1,8 mm. broad near the articulation with the palm, almost one and a half times as long as broad; upper margin straight. The chela is 5,7 mm. long, the palm 2,9 mm. long and 1,9 mm. broad, the palm being a little longer, though nearly as broad, as the carpus. The joints are fringed with hairs just as in the other leg.

The 2nd legs show nothing remarkable. The carpus ot the 3rd legs (Fig. 29*e*) is 2 mm. long and half as thick at the distal end, that, on its outer side, is fringed with long hairs, except in the middle. The propodus bears proximally an obtuse lobe on the hinder edge and resembles that of *Call. mucronata*. Measured between the carpal articulation and that of the dactylus, this joint proves to be 1,4 mm. long, but from the extremity of the hinder lobe to the distal end of the upper border 1,8 mm.; in the middle of the latter direction the propodus presents its greatest width of 0,96 mm., appearing not yet twice as long as broad. The lobe on the hinder edge measures about one-fourth the longer diameter of this joint; the upper border is slightly convex, the lower somewhat concave, but not emarginate and armed with a short spine near the distal end. The terminal joint, 0,8 mm. long and 0,48 mm. broad, is short and more than half as broad as long.

The two last pairs of legs agree with those of *Call. mucronata*.

In the somewhat younger specimen from Stat. 58 the 2nd segment of the abdomen is a little longer than the 6th and in both legs of the 1st pair the palm appears in proportion to the fingers a little longer.

Call. placida is apparently most closely related to *Call.* (*Callichirus*) *Coutierei* Nobili, a species found at Perim, Djibouti and Aden (G. Nobili, in: Annales des Sciences Nat. 9e Série, Zool., Paris 1906, T. IV, p. 110, Pl. VII, fig. 1—1*b*). Two adult females, one of which with eggs, of this species were kindly sent me in 1905 for examination by Dr. Nobili. The female of *Call. Coutierei* attains a length of 80 mm. It is a pity that of *Call. placida* no egg-bearing specimens were collected, because it is now uncertain whether the female from Stat. 142 is full-grown or not. In *Call. Coutierei* the median rostral spine is obliquely directed upward, whereas in *Call. placida* it is slightly curved downward. In both species the cervical groove is equally far distant from the posterior margin of the carapace. The eyepeduncles of *Call. Coutierei* have a different form and agree more with those of *Call. mucronata*. In the adult, egg-bearing female of *Call. Coutierei* the eyepeduncles that just project beyond the distal end of 1st antennular article, are 2,65 mm. long and 1,4 mm. broad at their base, almost twice as long as broad; the strongly convex, oval cornea is placed subterminal, immediately behind the narrow extremity of the peduncle, on its outer side and this narrow, obtuse, terminal part of the peduncle, that measures one-ninth its length, is therefore situated in front of the cornea; the cornea is about one and a half times or twice as far distant from the frontal border of the carapace as it is long. The caudal fan resembles that of *Call. placida*, but the inner uropod is shorter and broader. The first legs bear a close resemblance, but the acute spines on the lower

border of the ischium are placed perpendicular to that border, whereas they are directed obliquely forward in *Call. placida.*

Call. (*Callichirus*) *tridentata* von Martens differs from *Call. placida* at first sight by the peduncles of the inner antennae that are not shorter but longer than those of the outer, while their flagella are shorter than the peduncles, not longer, by the characters of the chelipeds, by the propodus of the 3rd legs which is trilobate and still by other characters, for which I refer to my work on some species of the genus *Callianassa* (J. G. de Man, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. With 148 illustrations on 12 plates. 's Gravenhage 1928, in: Capita Zoologica. Deel II, Afl. 6).

15. *Callianassa* (*Callichirus*) *mucronata* Strahl. Pl. XIX, Figs. 30—30*e*.

Callianassa mucronata Strahl, in: Monatsber. der K. Acad. der Wissensch. Berlin 1861, p. 1056.
Callianassa mucronata A. Milne-Edwards, in: Nouv. Archives du Muséum. Mémoires, Paris 1870, T. VI, p. 94.
Callianassa mucronata J. G. de Man, in: Archiv f. Naturg. Jahrg. 53, 1888, p. 484, Taf. XXI, fig. 2. — A. Ortmann, in: Zoolog. Jahrb. VI, 1, Abth. für Syst., 1891, p. 57 and in: Jenaische Denkschr. VIII, 1894, p. 23.
Callianassa (*Cheramus*) *novaeguineae* J. Thallwitz, Decapoden-Studien, Berlin 1891, p. 31.
Callianassa novaeguineae J. G. de Man, in: Abhandl, d. Senckenb. Naturforschenden Gesellschaft, Frankfurt am Main 1902, Bd. XXV, p. 757.

Stat. 125. July 18/19. Anchorage off Sawan, Siau-island. Reef. Two females, one of which is adult, ova-bearing, the other young.
Stat. 131. July 24/25. Anchorage off Beo, Karakelang-islands. Reef. One female without eggs.
Stat. 174. August 28/29. Waru-bay, North Coast of Ceram. Reef. One male.
Stat. 231. Ambon. Reef. Three females without eggs.

Strahl's description of this species is rather short and incomplete, therefore two females from Ambon were sent by me to the Zoological Museum in Berlin, where Dr. Pappenheim stated them to agree with the type specimen.

The egg-bearing female from Stat. 125, which is quite undamaged and therefore chosen for the following description, is 29 mm. long, apparently not yet full-grown, because this species attains the length of 40 mm. (de Man, l. c.). Carapace, (rostrum included) 6,5 mm. long, abdomen 22,5 mm., the former measuring not yet one-third the length of the latter. The strongly defined cervical groove reaches further backward than in *Call. placida*, to which this species is closely allied: its distance, 1,02 mm., from the posterior margin of the carapace is barely one-sixth, in *Call. placida*, however, one-fifth the length of the latter. The pointed spiniform rostrum reaches to the middle of the distance between the anterior border of the carapace and the distal end of 1st antennular article: according to Ortmann the length of the rostrum should be somewhat variable. The angle of the anterior border between the eyestalks and the antennal peduncle is dentiform, sharp, as has already been described by Dr. Thallwitz (l. c.), but it is not prolonged into a spine as in *Call. placida.*

Abdomen much similar to that of *Call. placida.* Second segment longer than the others and even a little longer than the 6th, the 6th slightly broader than long. The 3rd, 4th and 5th segment bear, as in *Call. placida*, a tuft of hair laterally. Fifth segment slightly longer than 3rd, 4th shorter than them. The posterior border of the telson is slightly concave; in the female

from Amboina, described by me in 1888, it is more distinctly concave, whereas in the specimens, collected by the "Siboga" on the same island, the posterior margin is slightly convex in the middle: all individual varieties.

The somewhat curved anterior border of the outer uropod (J. G. DE MAN, l. c.. fig. 2*a*) makes an obtuse angle with the rounded distal border; the raised part of the upper surface reaches barely to the middle of the plate and has a somewhat other form than in *Call. placida*, because the distal border is a little shorter in proportion to the inner. There is a small spine at the base near the inner margin. The longitudinal rib on the upper surface of the inner uropod is quite distinct and runs nearer to the posterior than to the anterior border: in the female from Amboina, described by me in 1888, it did not occur or was not observed. Dr. PAPPENHEIM informed me that the posterior border of the inner uropod, which in the specimens from the reef at Ambon is regularly rounded, appears in STRAHL's type angular in the middle: this slight difference is no doubt individual.

The 1st pleopods (Fig. 30*d*) of the male from Stat. 174, which is 25 mm. long, are uniramous, two-jointed filaments, 1,5 mm. long; the 1st joint proves to be 0,8 mm. long, measured in the middle, and 0,28 mm. broad, i. e. about two-fifths the length. Terminal joint 0,7 mm. long, nearly as long as the other, somewhat broadening distally; the distal extremity, that is 0,28 mm. broad, about one-third the length of this joint, ends anteriorly in an obtuse tooth that carries at the tip 4 to 6 long setae, 1—1,3 mm. long, and some very short hairs, 0,06 mm. long, posteriorly in a hooked tooth, which reaches a little beyond the other and that bears also some long setae on its posterior margin. The 2nd pleopods of the male are biramous, subfoliaceous filaments; they are 3,2 mm. long and end in two branches, the outer one of which is 1,6 mm. long and rather narrow, being more than 4-times as long as broad; the inner branch is just as long, measured from its articulation with the basal joint to the tip, but it is twice as broad and appears therefore foliaceous; both branches have obtuse tips that carry some long setae, on the inner branch 1,5 mm. long, on the other shorter. The pleopods of the three following segments are biramous, foliaceous and considerably larger than the preceding. The stylamblys is very short, 0,3 mm. long, 0,18 mm. broad at base and sharp-pointed; its outer border is provided with cincinnuli on its distal half and it is 4- or 5-times as far distant from the base of the endopodite as it is long.

The 1st pleopods of the female are two-jointed, uniramous, moderately slender filaments; the terminal joint, one and a half times as long as the first, is in the female without eggs, long 36 mm., from Amboina (Fig. 30*e*) 2,5 mm. long, elongate, sole-shaped, its breadth in the middle being one-fifth its length; it is fringed with long ciliated setae. Second pleopods much similar to those of the male, being biramous filaments, the inner branch twice as broad as the outer, which is 2,8 mm. long and 7-times as long as broad, appearing therefore rather slender. Both have obtuse extremities and there is on the inner border of the inner branch a short obtuse appendix, 0,15 mm. long, not far from the tip, barely twice as far as it is long; in the egg-bearing female from Stat. 125 it is just as long, but it is here finger-shaped, 3-times as long as thick. This appendix, mentioned already by THALLWITZ, is apparently a rudimentary stylamblys, but it is destitute of cincinnuli. The pleopods of the three following pairs are biramous, foliaceous, similar to those of the male; the stylamblys is here very short, 0,48 mm. long, 0,26 mm. broad

at its base, shaped as in the male and 4-times as far distant from the base of the endopodite as it is long.

Eggs numerous, globular, small, diameter 0,65 mm.

Eyestalks contiguous, 1,14 mm. long, reaching to the distal extremity of 1st antennular article. They are not rounded distally as in *Call. placida*, but end in an obtuse narrow apex and present the convex, black pigmented and distinctly faceted cornea immediately behind this dentiform tip, on the outer side of the stalk; the eye is large, its diameter of 0,54 mm. being almost half as long as the eyestalks.

Inner antennae (Fig. 30) 6,14 mm. long, a little shorter than the carapace, their peduncle 2,94 mm., their flagella 3,2 mm. long; the latter are little longer than the peduncle. Distance between the anterior margin of the carapace and the distal extremity of 1st antennular article 1,14 mm. long; 2nd joint 0,52 mm. long, 0,36 mm. thick, once and a half as long as thick, comparatively thicker than in *Call. placida*. Third joint slightly tapering forward, when looked at from above, 1,28 mm. long and 0,29 mm. thick, almost $2^1/_2$-times as long as 2nd and about 5-times as long as thick. Upper flagellum 2,92 mm. long, composed of 24 segments; the first segments are little broader than long in a lateral view, so e. g. is the 3rd segment 0,18 mm. long and 0,2 mm. thick; the following become gradually broader until the 13th segment, which is 0,12 mm. long and 0,26 mm. broad, twice as broad as long. The remaining segments narrow gradually, so that the penultimate is 0,08 mm. broad and just as long; the terminal segment is 0,15 mm. long and about half as thick at its base. The upper flagellum has therefore the same form as in *Call. placida*, but it appears broadest, in a lateral view, at one-third its length from the extremity. The lower flagellum, fringed like the peduncle on its lower side with long ciliated hairs, is 3,2 mm. long, slightly longer than the other and composed of 19 segments that are nearly all somewhat longer than broad; it is half as long as the carapace, — according to STRAHL, however, it should be as long as it, a difference that cannot more be explained, because in the type specimen the flagella are broken off, as Dr. PAPPENHEIM wrote me.

External antennae 12 mm. long, shorter than half the body. The peduncle that measures 3 mm., is nearly as long as that of the inner antennae, barely reaching beyond it; it remained doubtful, whether there is a trace of a scaphocerite, but a minute spine is wanting. The 4th and the 5th joints are of equal length, 1 mm. long, and are more slender than the antennular peduncle; the flagellum, composed of 48 segments, that are mostly a little longer than thick, is 9 mm. long, 3-times as long as the peduncle (in *Call. placida* 5-times), nearly one-third the length of the body (in *Call. placida* half the length of the body).

The external maxillipeds (Fig. 30*a*) resemble much those of this species. The ischium is longer in proportion to its breadth, measured in the middle, both longitudinally and transversely, it appears to be 1,92 mm. long and 1,18 mm. broad, more than one and a half times as long as broad. Merus triangular, because there is no anterior margin as occurs in *Call. placida*; the merus is 1,12 mm. long, measured from the tip to the posterior margin, and 1,22 mm. broad, the outer border is somewhat curved, the antero-internal at first straight, then regularly curved. Carpus 1,44 mm. long, 0,88 mm. broad distally, as in *Call. placida*. The propodus, though likewise much expanded, has another form as in *Call. placida*;

it is 1,42 mm. long and 1,02 mm. broad in the middle, appearing a little longer in proportion to its breadth, there is no distal margin, for the propodus is bordered below, between both articulations, by a regularly curved border. The finger-shaped dactylus is 0,9 mm. long, without the terminal claw, which is surrounded by stout bristles as in *Call. placida*; the dactylus is 0,28 mm. broad, not far from its base. The comb of sharp spines on the inner surface of the ischium proceeds from the anterior border somewhat nearer to the inner than to the outer border; it runs at first straight backward to the middle of the joint, curves then outward until the articulation with the 2nd joint and finally turns again inward. It is composed of 30 spines which on the anterior half of the row are more crowded and of unequal size, on the posterior more distantly placed. The arrangement of the setae and bristles on the inner surface of the following joints agrees with *Call. placida*.

In the ova-bearing female from Stat. 125 the larger cheliped (Fig. 30*b*) is placed on the left side, in the other specimen on the right; the slight differences from the description, published by Dr. Thallwitz and myself (l. c.), of a type specimen, long 40 mm., of *Call. novaeguineae* = *mucronata*, are to be put down to the larger size of this specimen. The postero-internal border of the coxae of both legs ends in a short tooth, that carries a tuft of hairs. The lower edge of the ischium is not quite entire, but presents a few minute denticulations along its whole length. Merus 4 mm. long, 3 mm. broad, lower border sharp, lamellar, denticulate along its whole length. Carpus 2,4 mm. long in the middle, 4 mm. broad distally, in the type of *Call. novaeguineae* it was just half as long as broad. Chela 8,25 mm. long, palm 5,5 mm. long, 4,5 mm. broad, fingers a little shorter in proportion to the palm than in the full-grown type. Dactylus with two large obtuse tubercles on its proximal half, followed by a third smaller tooth, immobile finger with one tooth in the middle.

The smaller (right) cheliped much agrees with that of the adult female from Amboina, figured by me in 1888 (l. c. fig. 2*b*), though in this female carpus and palm appear a little longer in proportion to their breadth; the lower border of the ischium is entire. In the female without eggs from Stat. 131 that is 25,5 mm. long, the carpus of the smaller (right) cheliped has a somewhat slenderer form, being 2,25 mm. long and 1,45 mm. broad, whereas of the egg-bearing female from Stat. 125 the carpus is 2,7 mm. long and 2,15 mm. broad; merus and chela are also a little less broad in proportion to their length and the fingers are somewhat slenderer. In a female, long 36 mm., from Amboina without eggs the smaller (right) cheliped presents the same more slender form; the carpus is 3 mm. long and 2 mm. broad, the palm is not broader than the carpus and the upper border of carpus and palm is straight, not curved. In another female from the same locality the right leg seems to be the smaller (the other leg is wanting), because the merus has the typical form; this joint, indeed, is 3 mm. long and 1,8 mm. broad. Carpus and palm are, however, considerably broader in this leg than in the typical form, so that the chela especially shows some resemblance with that of the larger cheliped. The carpus is 2,3 mm. long and 2,2 mm. broad distally, appearing almost as broad as long; the chela is 5,5 mm. long, the palm 3,5 mm. long and 2,5 mm. broad. The form of the smaller cheliped proves thus to be rather variable in this species.

Carpus of 2nd legs half as broad as long, chela shorter and less broad than carpus. Third legs (Fig. 30*c*) similar to those of *Call. placida*. Carpus 2,4 mm. long and half as broad distally.

Propodus 1,6 mm. long from articulation to articulation and 1,82 mm., when measured between the tip of the obtuse lobe on the hinder edge and the distal end of the somewat curved upper border; it is 1,14 mm. broad in the middle, little more than one and a half times as long as broad and somewhat broader than in *Call. placida*. The obtuse lobe on the hinder edge measures one-sixth the longer diameter, the lower border is straight, not emarginate, and bears a short spine at the distal end.

The two other legs and also the sternal plaque between them agree with those of *Call. placida*.

Call. mucronata Strahl bears also some resemblance to *Call.* (*Callichirus*) *Coutierei* Nobili from Djibouti, Perim and Aden. This species, however, two adult females of which were kindly sent me for examination by Dr. Nobili, (Confer p. 174), may be distinguished by the following characters. Its size is twice as large, this species attaining a length of 80 mm. The median rostral spine is obliquely directed upward and on each side of it there is another. The cervical groove is farther distant from the posterior margin of the carapace, this distance being one-fifth the length of the latter, not one-sixth. The abdomen resembles that of *Call. mucronata*, but the inner uropod is comparatively shorter. The cornea is smaller, compared with the length of the eyepeduncle. The propodus of the external maxillipeds is a little more dilated. In both legs of the 1st pair the lower border of the ischium is armed with acute spines, that make right angles with the lower border itself and the larger cheliped has also a somewhat different form. There are no doubt still other differences of less importance.

16. *Callianassa* (*Callichirus*) *audax* de Man. Pl. XX, Figs. 31—31*i*.

Callianassa audax J. G. de Man, in: Notes from the Leyden Museum, Vol. XXXIII, 1911, p. 223.

Two female specimens without eggs of subequal size, collected in 1892 in the Straits of Malacca.

A remarkable species which in many characters presents some relationship with *Call.* (*Callichirus*) *Kraussi* Stebbing from the Cape of Good Hope.

The larger specimen, measured in the middle line, is 67 mm. long, the carapace being 17,5 mm. long; in the other specimen these numbers are respectively 60 mm. and 16 mm.; the carapace is thus but little longer than one-fourth the length of the body and than one-third that of the abdomen. Sutures of the carapace deep. Rostrum (Fig. 31) very short, measuring about one-sixth the length of the eyestalks, much broader at its base than it is long, depressed and rather obtuse; close by the lateral margins that like the whole frontal margin are fringed with short hairs, the upper surface of the rostrum presents some impressed points. At either side of the rostrum between the eyestalk and the antennal peduncle one observes a rounded prominence, only half as long as the rostrum itself.

Eyestalks almost as long as basal antennular article, twice or a little more than twice as long as broad at their base and with the subacute tips slightly turned outward; while the inner borders are straight and almost contiguous, the outer converge at first slowly, but, curving, beyond the eyes more rapidly toward the tip. Eyes black, situated just in the middle on the outer half of the peduncle; while the eyes are just half as wide as the stalk in the younger

specimen, they are a little broader in the other. The eyestalks are flattened above, excepting the terminal half, which is slightly convex.

Antennulae slightly shorter than the carapace, measured in the middle line; 2nd joint somewhat more than one and a half times as long as thick and a little shorter than 1st; 3rd one-fourth longer than 2nd, regularly narrowing forward and nearly 3-times longer than broad in the middle. Flagella of equal length (10,5 mm.), a little more than once and a half as long as the peduncle (6 mm.); lower flagellum tapering to a fine point, its outer border fringed with setae, that are also observed on the outer border of the 2nd and 3rd joint of the peduncle; the upper flagellum presents the same width along four-fifths of its length, slightly widened at one-tenth its length from the tip and hence rapidly tapering.

External antennae one and a half times as long as the inner antennae and as the carapace, measured in the median line. Antennal peduncle outreaching the peduncle of the inner antennae by one-fourth its terminal joint, which is much thinner but nearly as long as the 3rd joint of the latter; scaphocerite movable, very small, triangular, as long as broad at its base, with the tip rather obtuse; flagellum 18 mm. long, a little more than twice as long as the peduncle and almost twice as long as the flagella of the inner antennae.

The external maxillipeds (Fig. 31*b*) much resemble those of *Glypturus Branneri* Rathb. from the coast of Brazil (M. J. Rathbun, in: Proc. Washington Acad. Sciences, Vol. II, 1900, p. 150, Pl. VIII, fig. 7), but the carpus is distinctly less broad than the propodus. Measured in the middle, the ischium, 4,5 mm. long, appears almost one-third longer than the merus (3,75 mm.) and almost as wide (3,8 mm.) as long; whereas in *Glypturus Branneri* both the outer and the inner border of the ischium should be straight according to the figure, in *Call. audax* both margins are decidedly curved. Merus one-third broader than long. The outer surface of both joints is rather flattened, but near the proximal articulation the ischium appears distinctly concave; the inner surface of both joints is also concave and bordered near their outer margin by a longitudinal row of long hairs, but the sharp, prominent, spinous crest, with which the ischium is armed in *Glypturus acanthochirus* Stimps., is wanting completely. The carpus is just as long as the merus and one and a half times as long as broad. The propodus, 3 mm. long and 3,25 mm. broad, is one-fourth shorter than the carpus, a little broader than long and distinctly broader than the carpus, though not twice as broad as in *Glypturus acanthochirus*; lower border arcuate, anterior slightly oblique and making an obtuse angle with the lower, that passes with a regular curve into the truncate posterior. Dactylus a little shorter than the propodus, slightly compressed, hairy; the inner border of the preceding joints is also hairy like the anterior border of the propodus and one observes a tuft of short setae on the inner surface of the carpus near the propodal articulation and another not far from it on the inner side of the propodus near the carpal articulation.

The legs of the 1st pair resemble somewhat those of *Call. gigas* Dana, but the merus of the larger cheliped is not armed with a single tooth on the proximal end of the lower border; in the larger specimen the right cheliped is the larger, in the other the left. Ischium of the larger cheliped (Fig. 31*c*) claviform, the proximal half being narrow, the distal half thickened, lower border finely serrate along its whole length. Merus a trifle shorter than the preceding joint, without strongly developed teeth or spines, but with the lower border widened

from near the proximal extremity to a little beyond the middle; the merus, 8 mm. long, is 5 mm. broad on the dilated part, appearing only a little more than one and a half times as long as wide. The lower border is finely denticulate by 13 or 14 small, acute teeth and a little hairy, the slightly curved upper border is also finely serrate along its whole length and a little hairy; the convex upper surface of the merus is smooth, the outer is covered with some small granules that disappear near the denticulate lower border, while in the younger specimen these granules are still wanting. On the distal half of the flattened inner surface of the merus 4 small tufts of setae are situated behind one another, while one observes 4 very small granules close to the articulation with the ischium. Measured along the nearly straight upper border, that on its outer side appears entire and smooth, but on the inner finely serrate, the carpus proves to be 7,75 mm. long, nearly as long as the merus, and, being 8,25 mm. broad, about as long as broad or deep. Outer and inner side of the carpus slightly convex, smooth and shining; the lower border, somewhat compressed distally and terminating in a small compressed tooth, appears, like the upper, on the outer side entire, on the inner inconspicuously serrate. Chela 15,5 mm. long, twice as long as the carpus, when measured along the upper border; palm 10,5 mm. long, one-third longer than the carpus, near the carpal articulation just as broad as the carpus, but slightly decreasing in breadth distally. Upper border of the palm carinate from the carpal articulation to a little beyond the middle, the rest of the upper border rounded and entire. Outer and inner surface of the palm slightly convex, smooth and shining, lower border of the chela finely denticulate along its whole length to near the tip of the fixed finger. The fingers (Fig. 31*d*), half as long as the palm, shut close together, while the pointed tips cross one another. Dactylus rather coarsely granulate on its upper border and on its inner lower surface, its outer surface smooth, except a few granules near the prehensile edge; the latter with a long granulate prominence on the proximal half, that is followed by a sharp somewhat compressed tooth. Inner upper side of the fixed finger granulate, prehensile border finely denticulate, the distal third part excepted. Distal border of the palm, near the articulation of the dactylus, granulate both on the inner and the outer side. In the younger specimen the fingers are a little longer in proportion to the palm and the granulation is much less developed.

The small cheliped (Fig. 31*e*) has, as in *Call. gigas*, a quite other form than the large. Ischium narrow, compressed, a little broader at both extremities than in the middle and quite smooth. Merus a little shorter than ischium, of a somewhat ovoid shape, twice as long as broad, smooth, the upper border slightly arcuate, the lower less so and a little hairy. Measured along the straight upper border the carpus proves to be 8,5 mm. long, one-third longer than the merus and 3-times as long as wide; the lower border, also straight, runs parallel with the upper, so that the carpus presents the same width along its whole length; it appears a little less broad than the merus. Chela 8 mm. long, a little shorter than the carpus, the palm, 4,25 mm. long, slightly longer than the fingers; the palm, which proximally appears almost as broad as the carpus, decreases slightly in breadth distally. The lower border of the chela is carinate, like that of the carpus and the upper border of the palm is also carinate to just beyond the middle. The fingers that shut close together, are setose and the cutting-edges are finely denticulate along the proximal half, the small sharp teeth being a little larger on the immobile finger than on the dactylus. Carpus and chela are, like the preceding joints, quite smooth.

The 2nd legs closely resemble those of *Call. armata* A. M.-Edw. (Nouv. Archives du Muséum. T. VI, 1870, Pl. I, fig. 8): the merus, 8 mm. long, is $2^2/_3$-times as long as broad in its proximal half.

The lobe on the hinder edge of the propodus of the 3rd legs (Fig. 31*f*) is much developed and these legs closely resemble those of *Call. Kraussi* Stebbing (South African Crustacea, I, 1900, Pl. III, fig. 3), but the anterior part of the propodus is almost one and a half times as broad as the posterior lobe and the posterior border, which in *Call. Kraussi* is distinctly concave, appears in *Call. audax* straight. Dactylus as in *Call. Kraussi*, merus a little more than 3-times as long as broad.

The 4th legs resemble also those of *Call. Kraussi*, but the merus that slightly grows broader distally and that is 4-times as long as broad in the middle, is a little curved.

Merus of 5th legs also 4-times as long as thick in the middle, slightly curved and slightly thickening distally, the somewhat compressed carpus also thickens a little towards the distal articulation.

Abdomen rather broad and depressed. First segment 7,75 mm. long, a little less than half as long as the carapace; at each side a deep groove runs close by and parallel with the lateral borders, the two grooves converge forward like the margins and reach to the distal fourth part of the segment. Second segment one-third longer than 1st, 10,25 mm. long, 11,75 mm. broad, and with an oblique depression near each antero-lateral angle. Measured in the middle line the 6th segment (Fig. 31*a*), rather strongly convex transversely and slightly also from before backward, proves to be 7,75 mm. long, while it is one-third broader than long, presenting its greatest width of 10,25 mm. at the anterior third. The lateral borders present at the posterior third a short furrow that runs transversely inward; a slightly arcuate, transverse groove runs just before the posterior margin and as well from the middle as from the lateral extremities of this groove a short furrow proceeds on the upper surface forward, the median furrow being more distinct than the lateral ones; the latter run obliquely forward and outward, terminating into the anterior transverse furrows.

The telson, which is 4,25 mm. long and 6,25 mm. broad, is much shorter than the 6th segment and nearly one and a half times as broad as long. Lateral margins slightly curved, posterior margin obtuse in the middle, at either side of which one observes a small, low, rounded prominence, a little more prominent than the obtuse middle, so that the margin appears slightly undulate. The upper surface of the telson shows in the middle a rectangular cavity, a little longer than wide, and reaching to the anterior third part which appears transversely convex; at each side of this cavity that occupies the middle third part of the telson and the lateral borders of which are punctate, one observes another more shallow pit that almost extends to the lateral margins.

Uropods much longer than the telson. Inner uropod triangular, almost twice as long (6 mm.) as broad (3,5 mm.), subacute, outer margin straight and shorter than the inner, which is a little curved; upper surface with an arcuate, little prominent ridge, that runs near the inner border to the tip. The anterior branch of the outer uropod does not project beyond the inner or posterior, therefore does the outer uropod appear regularly oval, nearly one and a half times as long (8,25 mm.) as broad (5,25 mm.), with the borders regularly rounded;

from the articulation a prominent ridge runs obliquely backwards, bending towards the rounded posterior end of the lamella, and between this ridge and the rounded anterior end is situated the outer branch or raised part of the uropod; the outer margin of this raised part is tomentose, while the tip is obtuse. The described curved ridge and the inner border of the raised part are also prominent on the lower surface of the uropod, while the inner uropod appears completely flattened below; the outer uropod does not extend beyond the inner.

The 1st pleopod (Fig. 31*g*) is clothed with long setae, most of which are feathered, the peduncle is slightly curved and thicker in the middle than at both extremities; the ramus, about as long as the peduncle, proved to consist of two joints, the first is a little longer but much thicker than the 2nd, which, 4-times as long as broad, presents along its whole length the same width and the tip is obtuse. Second pleopods biramous and also clothed with long setae; of the two rami that are equally long and depressed and that slightly narrow from the base to the obtuse tip, the inner appears about twice as broad as the outer, which is implanted on the anterior third of the stalk; the stalk is a little shorter, but broader or thicker than the rami. The inner ramus did not present a trace of an appendix interna or stylamblys. The pleopods of the three following segments (Fig. 31*i*) show nearly the same form as those of the species, figured by Boas (Studier over Decapodernes Slaegtskabsforhold, 1880, Tab. V, fig. 177). The sickle-shaped outer rami are much longer than the inner, rounded at the tip, their outer margin is strongly curved and the arcuate ridge that one observes on their anterior surface and which on the posterior appears as a narrow groove, runs nearer to the middle than in Boas's species; posteriorly the outer margin of these rami terminates in a small, obtuse lobe. The inner rami look like a rectangular triangle, two sides of which are equally long, while the hypotenuse is slightly curved; the straight, inner margins of the pleopods of every segment shut close together apparently by a retinaculum, which, however, is so small that it was not observed. A faint ridge is visible both on the outer and on the inner surface of the inner rami, that run from their posterior margin to their tip.

Call. (*Callichirus*) *Kraussi* Stebbing from the Cape of Good Hope differs by the following characters. The peduncle of the inner antennae is almost twice as long as that of the outer, the 3rd joint much longer and slenderer; the telson is less broadened, the inner uropod longer and narrower. In the larger cheliped the carpus is longer than the palm and appears less broad in proportion to its length, in the smaller the carpus has a stouter shape, the palm shorter and there are still many other differences.

INDEX

Note. — Synonyms are printed in Italics. The more important pages are indicated by heavier type.

acanthochirus (Glypturus) **19.** 25. 180.
aequimana (Callichirus) (Callianassa) 28. 93. 114.
affinis (Trypaea) (Callianassa) 27. 101.
affinis (Upogebia) (Upogebia) 22. 36. 38. 46.
africana (*Upogebia*) (*Upogebia*) 22. 37. **51.**
Amboinae (Scallasis) (Callianassa) 30. 93.
amboinensis (Trypaea) (Callianassa) 27. 93. 107. **165.**
ancylodactyla var. amboinensis (Calliadne) (Upogebia) 24. 38. 50. **89.**
ancylodactyla (Calliadne) (Upogebia) 18. 24. 38. 50. 84. 85. **87.** 90.
anomala var. squamifera (Thalassina) 1. 4. 5. **12.**
anomala (Thalassina) 3—**5.** 14.
anomalus (Astacus) (Cancer) 3. 5.
armata (Callichirus) (Callianassa) 28. 93. 109.
articulata (Callichirus) (Callianassa) 28. 94. 108.
assimilis (Callichirus) (Callianassa) 28. 93. 109.
astacina (Laomedia) 15. **16.**
atlantica (Callichirus) (Callianassa) 28. 94. 112.
audax (Callichirus) (Callianassa) 28. 93. 113. **179.**
audax (Callianassa) 1. 18.
australiensis (Trypaea) (Callianassa) 27. 93. 104. 134.
Axianassidae **15.**

Balssi (Ctenocheles) 25.
Balssi (Upogebia) (Upogebia) 22. 37. 43.
barbata (*Gebia*) 60.
Batei (Cheramus) (Callianassa) 26. 94. 95. 97. 98.
Bigea 18. 20. 25.
Bocourti (Callichirus) (Callianassa) 28. 94. **115.**
Bouvieri (Trypaea) (Callianassa) 27. 107. **146.**
Bowerbankii (Calliadne) (Upogebia) 24. 37. 48.
brachyophthalma (Trypaea) (Callianassa) 27. 94. **115.** 134.
Branneri (Glypturus) **19.** 25.
brevicaudata (Callichirus) (Callianassa) 28. **115.**

caecigena (Calliactites) (Callianassa) 20. 25. 95. 96. 124.
californiensis (Trypaea) (Callianassa) 27. 105.
californiensis var. japonica (Trypaea) (Callianassa) 27. 93. 105.
Calliactites 25. 91. **95. 96.**
Calliadne 24. 35. 47.
Callianassa 18—20. 25. **91.**
Callianassidae **18.** 20. 21.
Callianassinae 20.
Callianidea 18. 20. 21. **30.**
Callianideinae 20. **30.**
Callichirus 28. 91. **96. 108.**
Calmani (Cheramus) (Callianassa) 26. 100.
capensis (Upogebia) (Upogebia) 22. 37. 41. 51.
cargadensis (Calliadne) (Upogebia) 24. 37. 48.
carinicauda (*Gebia*) 60.
carinicauda var. gracilipes (Upogebia) (Upogebia) 44.
carinicauda (Upogebia) (Upogebia) 18. 22. 38. 39. 44. 53. **60.** 66.
celebica (Callianassa) 25. **115.**
ceramica (Trypaea) (Callianassa) 27. 93. 104.
ceratophora (Upogebia) (Upogebia) 22. 38. 46. **69.** 75.
Cheramus 26. 91. **95. 97.**
chilensis (Thalassina) 3. 4.
chilensis (Trypaea) (Callianassa) 27. 94. 103.
coeca (? Scallasis) (Callianassa) 30.
Coutierei (Callichirus) (Callianassa) 28. 109. **174. 179.**
cristata (Trypaea) (Callianassa) 27. 107.
Ctenocheles 18. 20. 25.

Danai (Upogebia) (Upogebia) 22. 35. 38. 39. **52.** 54. 57.
Darwinii (Calliadne) (Upogebia) 24. 37. 50. 81. **84.** 88.
Darwinii (Gebiopsis) 84.
deltaura (Calliadne) (Upogebia) 24. 36. 49.

Eiseni (Callichirus) (Callianassa) 28.
Eiseni (Lepidophthalmus) **110.**
elongata (Callianidea) 21. 30.
exigua (Gebicula) 25. **60.** 66. 68.

fallax (Upogebia) (Upogebia) 22. 38. 42. **57.** 70.
Filholi (Trypaea) (Callianassa) 27. 93. 101. 104.
furcata (Calliadne) (Upogebia) 24. 36. 48.

Gebicula 18. 20. 25. 69.
gigas (Trypaea) (Callianassa) 27. 101. 134. 180. 181.
Glypturus 18. **19.** 20. 25. 111.
goniophthalma (Calliactites) (Callianassa) 25. 95. 96.
gracilipes (Upogebia) (Upogebia) 22. 36. 42.
gracilis (Thalassina) 3—5.
Grandidieri (Callichirus) (Callianassa) 28. 92. 110.
grandimana (Callianassa) **19.**
grandimana (Glypturus) 25.
Gravieri (Trypaea) (Callianassa) 27. 107.
guineensis (Callichirus) (Callianassa) 28. 94. 114.

Harmandi (Trypaea) (Callianassa) 27. 102.
heterocheir (Upogebia) (Upogebia) 22. 38. 47.
hexaceras (Calliadne) (Upogebia) 24. 38. 49. **81.** 85. 87. 88.
hexaceras (Gebiopsis) (Gebia) 81.
hirtifrons (Gebia) 52. 56.
hirtifrons (Upogebia) 43.
hirtifrons (Upogebia) (Upogebia) 22. 38. 43. **65.**
Hupferi (Gebicula) 25.

indica (Cheramus) (Callianassa) 26. 93. 100. 159. **160.**
intermedia (Axianassa) **15.** 17.
intermedia (Calliadne) (Upogebia) 82. 83. 87.
intermedia (Cheramus) (Callianassa) 26. 93. 97. 98. 137—139. **143.**
intermedia (Gebiopsis) 84.
intermedia (Gebiopsis) (Gebia) 84.
intermedia (Upogebia) 81. 84.
intermedia var. *amboinensis (Gebiopsis)* 89.
Issaeffi (Upogebia) (Upogebia) 23. 39. 41.
italica (Trypaea) (Callianassa) 27. 92. 101.

japonica (Trypaea) (Callianassa) 27. 93. 106.
joculatrix (Cheramus) (Callianassa) 18. 26. 93. 95. 98. **130.** 141. 146. 148. 151. 153.
Jousseaumei (Cheramus) (Callianassa) 26. 100. **165.**

Kraussi (Callichirus) (Callianassa) 28. 94. 95. 113. 179. 182. **183.**
Krukenbergi (Callianassa) 94.

laevicauda (Callianidea) 21. **30.**
Laomediidae **15.**
laticauda (Callichirus) (Callianassa) 28. 91. 92. 111.
lignicola (Calliactites) (Callianassa) 25. 95. 97.
littoralis (Risso) (Upogebia) (Upogebia) 23. 36. 41. 54.
littoralis G. O. Sars (Upogebia) (Upogebia) 23. 36. **51.** 63. 64.
lobetobensis (Cheramus) (Callianassa) 26. 93. 98. **137.** 158.
longimana (Trypaea) (Callianassa) 27. 102. 106. 134.
longipollex (Upogebia) (Upogebia) 23. 35. 39. **51.**
longiventris (Callichirus) (Callianassa) 19. 29. 94. 108.
longiventris var. Borradailei (Callichirus) (Callianassa) 29. 92. 108.

madagassa (Callichirus) (Callianassa) 29. 92. 113.
major (Callichirus) (Callianassa) 29. 91. 94. 111.
major (Upogebia) (Upogebia) 23. 39. 45. 62.
maldivensis (Trypaea) (Callianassa) 28. 92. 107. 134. 146.
marginata (Callichirus) (Callianassa) 29. 94. 113.
Martensii (Callichirus) (Callianassa) 29. 109. 171.
mauritiana (Cheramus) (Callianassa) 26. 99. 160—164.
maxima (Callichirus) (Callianassa) 29. 92. 112.
maxima (Thalassina) 3.
Metaxius **18.** 20. 21. 30.
Meticonaxius **18.** 20. 21. 30.
microps (Metaxius) 18. 20. 21.
minima (Cheramus) (Callianassa) 26. 94. 97.
minor (Cheramus) (Callianassa) 26. 92. 100.
modesta (Calliactites) (Callianassa) 18. 26. 93. 97. **118.** 129. 140. 153—155.
moluccensis (Cheramus) (Callianassa) 26. 93. 99. **159.**
monoceros (Upogebia) (Upogebia) 23. 38. 46. 70. 72. **75.**
monodon (Meticonaxius) **19.** 21. 30.
mucronata (Callianidea) 30. 31. 34.
mucronata (Callichirus) (Callianassa) 18. 29. 92. 93. 112. 171—**175.**

neglecta (Upogebia) (Upogebia) 23. 38. 42.
nitida (Calliadne) (Upogebia) 24. 36. 50.
nocturna (Jaxea) 15. **16.**
Novae-britanniae (Callichirus) (Callianassa) 29. 92. 93. 114.
Novae-britanniae var. (Callichirus) (Callianassa) 29. 114.

novaeguineae (*Callianassa*) 175. 178.
novaeguineae (*Cheramus*) (*Callianassa*) 175.

occidentalis (Callianassa) 25. **115.**
octoceras (Calliadne) (Upogebia) 24. 37. 49.
octoceras var. australiensis (Calliadne) (Upogebia) 24. 38. 49.
operculata (Calliadne) (Upogebia) 24. 37. 39. 50.
orientalis (Cheramus) (Callianassa) 26. 93. 98. 119. 132. **137.**
Osiridis (Upogebia) (Upogebia) 23. 35. 37. 40.

pachydactyla (Cheramus) (Callianassa) 19. 26. 94. 100. 121. 160—164.
Pestae (Callichirus) (Callianassa) 29. 92. 94. 111. 141.
petalura (Trypaea) (Callianassa) 28. **115.**
placida (Callichirus) (Callianassa) 29. 93. 108. **171.** 175—179.
praedatrix (Cheramus) (Callianassa) 26. 93. 97. 99. 127. 143—**146.**
propinqua (Cheramus) (Callianassa) 27. 93. 98. **127.**
pseudochelata (Upogebia) (Upogebia) 23. 37. 43.
Pugettensis (Upogebia) (Upogebia) 23. 39. 40. **56.**
pugnatrix (Cheramus) (Callianassa) 27. 93. 99. 138. 143. 144. 146. 150. **151.** 157. 158.
pugnax (Upogebia) (Upogebia) 28. 38. 45. 57—60. **66.** 70.
pygmaea (Cheramus) (Callianassa) 1. 18. 27. 93. 99. **155.**

rhadames (Calliadne) (Upogebia) 24. 37. 47.
Rochei (Trypaea) (Callianassa) 28. 104.
Rosae (Callichirus) (Callianassa) 29. 110.
rotundicaudata (Calliactites) (Callianassa) 26. 92. 94. 97. 123. 136. 149. 150.
rugosa (Calliadne) (Upogebia) 24. 37. 39. 50.

Sacculina 69.
Savignii (Calliadne) (Upogebia) 25. 35. 37. 47.
Scallasis 30. 91.
scorpionoides (Thalassina) 3. 14.
secura (Calliactites) (Callianassa) 26. 93. 96.
Sibogae (Cheramus) (Callianassa) 27. 93. 98. **124.**
Simsoni (Upogebia) (Upogebia) 28. 38. 40. **52.**
spinifrons (Upogebia) (Upogebia) 23. 38. 46. 53.
spinigera (Upogebia) (Upogebia) 23. 39. 45. 51.
Steenstrupii (Callianidea) 30.
stellata (*Gebia*) 37.
stellata (Upogebia) (Upogebia) 23. 36. 39. 42.
stellatus (*Cancer Astacus*) 35.
subspinosa (Upogebia) (Upogebia) 23. 37. **51.**
subterranea (Cheramus) (Callianassa) 27. 91. 92. 94. 97.
subterraneus (*Cancer Astacus*) 91.
sp. α (Upogebia) (Upogebia) 24. 38. 40. **52.**
sp. β (Upogebia) (Upogebia) 24. 39. 44. **66.**
sp. γ (Calliadne) (Upogebia) 25. 36. 49.
sp. (Calliactites) (Callianassa) 26. 93. 97. **116.**
sp. (Thalassina) 4.
sp. (Trypaea) (Callianassa) 28.
sp. (Upogebia) (Upogebia) 24.

Talismani (Upogebia) (Upogebia) 24. 36. 38. 47.
Thalassina 3.
Thalassinidae **3.**
Thaumastocheles 20.
tipica (Bigea) 25.
Trachelifer **15.**
tridentata (Callichirus) (Callianassa) 30. 93. 110. 171. **175.**
truncata (Trypaea) (Callianassa) 28. 92. 101.
Trypaea 27. 91. **96.** 100.
Turnerana (Callichirus) (Callianassa) 30. 94. 114.
typa (Callianidea) 18. 21. 30. **31.**
typus (*Callianidea*) 31.

uncinata (Trypaea) (Callianassa) 28. 91. 94. 102.
Upogebia 18. 20. 22. **35.** 39.
upogebiae (Pseudione) 37.
Upogebiinae 20.

vigilax (Callichirus) (Callianassa) 30. 93. 109.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1. *Thalassina anomala* (Herbst) var. *squamifera* de Man. — Right antennal peduncle of the female, long 160 mm., from Stat. 131, × 7 (*a* scaphocerite).

Fig. 2—2*c*. *Axianassa intermedia* W. L. Schmitt. Cotype from the island of Curaçao. — 2 Frontal border of carapace with eyestalks and basal part of the peduncles of the two pairs of antennae, × $37^1/_2$; 2*a* external maxilliped, outer side, × 19; 2*b*, 2*c* fusiform hairs on the inner border of the merus, × 56.

Fig. 3—3*f*. *Callianidea typa* H. M.-Edw. — 3 Frontal border of carapace with the eyestalks and the two pairs of antennae of the adult male from Stat. 64, × 9; 3*a* frontal border, eyestalks and basal joints of the inner antennae of this male, × $22^1/_2$; 3*b* frontal border of carapace with the eyestalks, the inner antennae and the peduncles of the outer of the youngest male from Stat. 34, × $22^1/_2$; 3*c* frontal border with the eyestalks and the basal joints of the inner antennae, × $37^1/_2$; 3*d* right pleopod of 1st pair of the male from Stat. 64, looked at from the posterior side, × 7; 3*e* left pleopod of 1st pair of the largest male from Stat. 34, looked at posteriorly, × 7; 3*f* left pleopod of 1st pair of the egg-bearing female from Stat. 37, looked at posteriorly, × 9.

Fig. 4. *Upogebia* (*Upogebia*) sp. *α*. Male from Stat. 149. — Anterior part of carapace, eyes and left antennal peduncle, × 75.

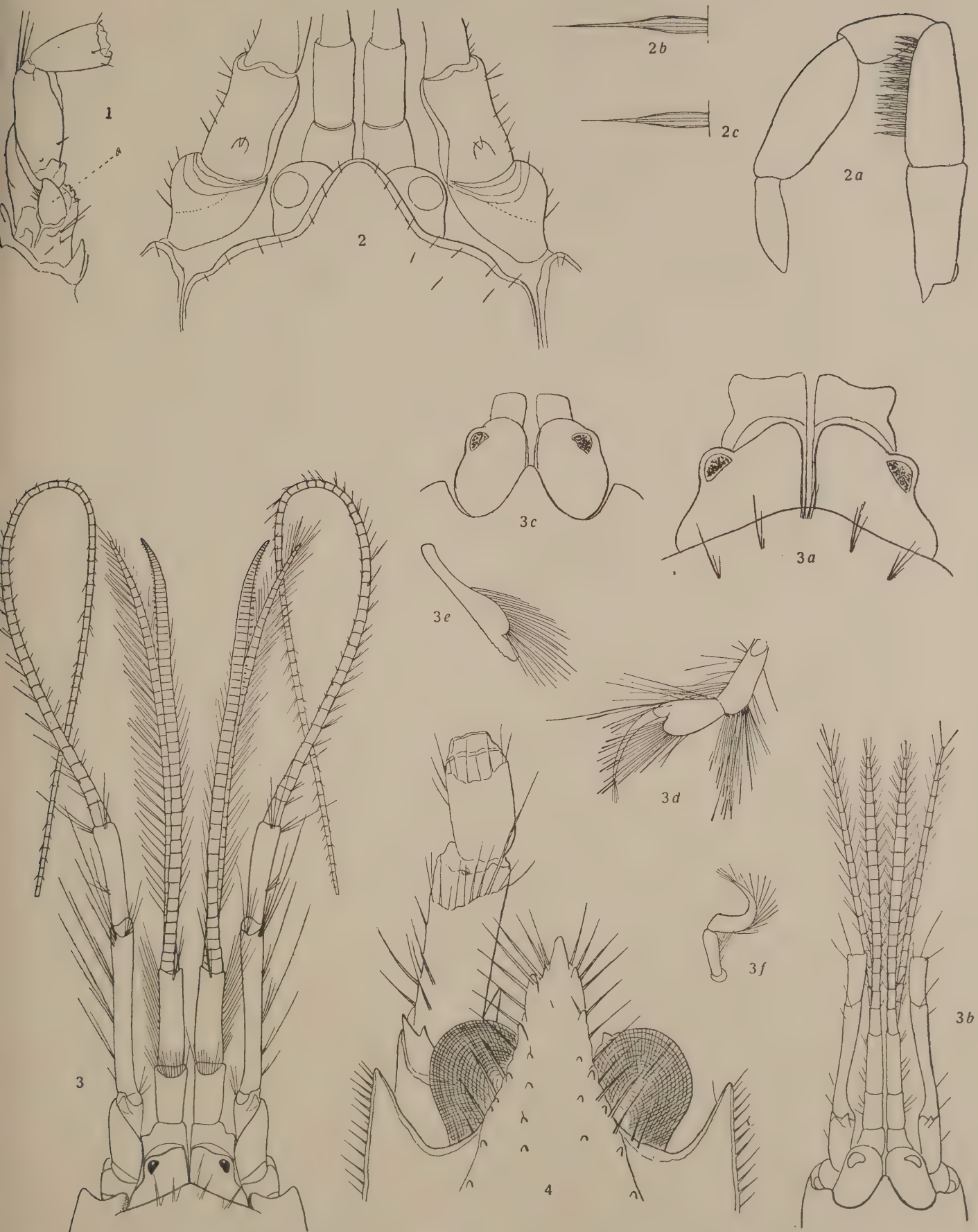
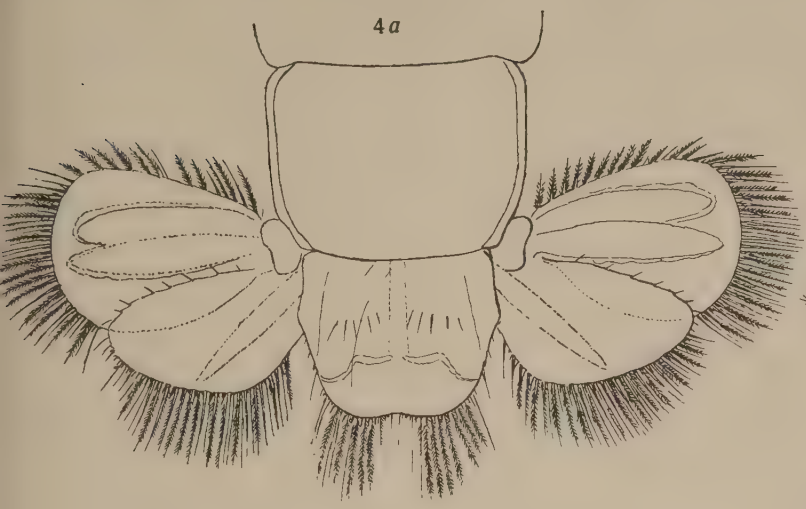


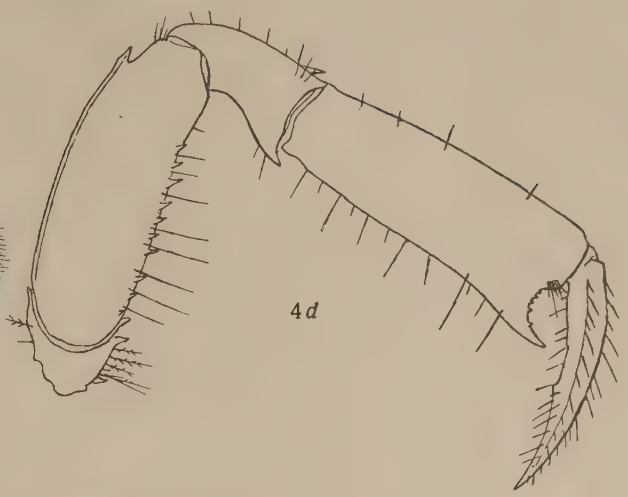
Fig. 1, 2—2*c* J. G. DE MAN, Fig. 3—3*f*, J. F. OBBES, Fig. 4 J. G. DE MAN, del.

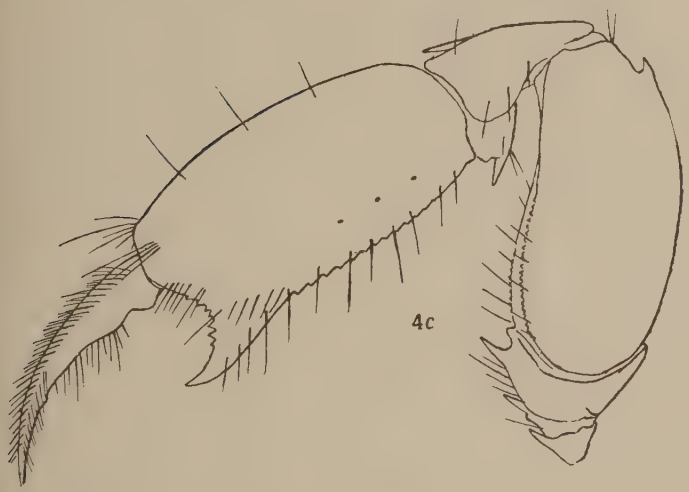
PLATE II.

Fig. 4*a*—4*f*. *Upogebia* (*Upogebia*) sp. *a*. Male from Stat. 149. — 4*a* Caudal fan, × 19; 4*b* left antennule, × 56; 4*c* left larger, 4*d* right smaller leg of 1st pair, outer side, × 22½; 4*e* left leg of 5th pair, outer side, × 37½; 4*f* distal end of the immobile finger of this leg, × 112.

Fig. 5. *Upogebia* (*Upogebia*) *fallax* de Man. Type specimen from Haingsisi. — Rostrum and anterior part of carapace, × 112.







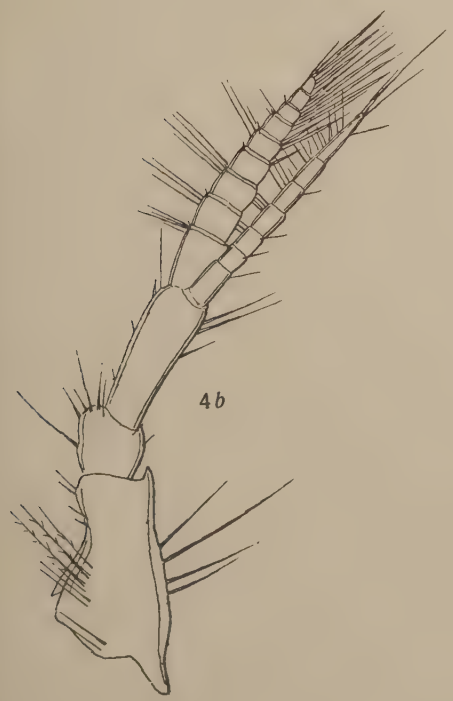


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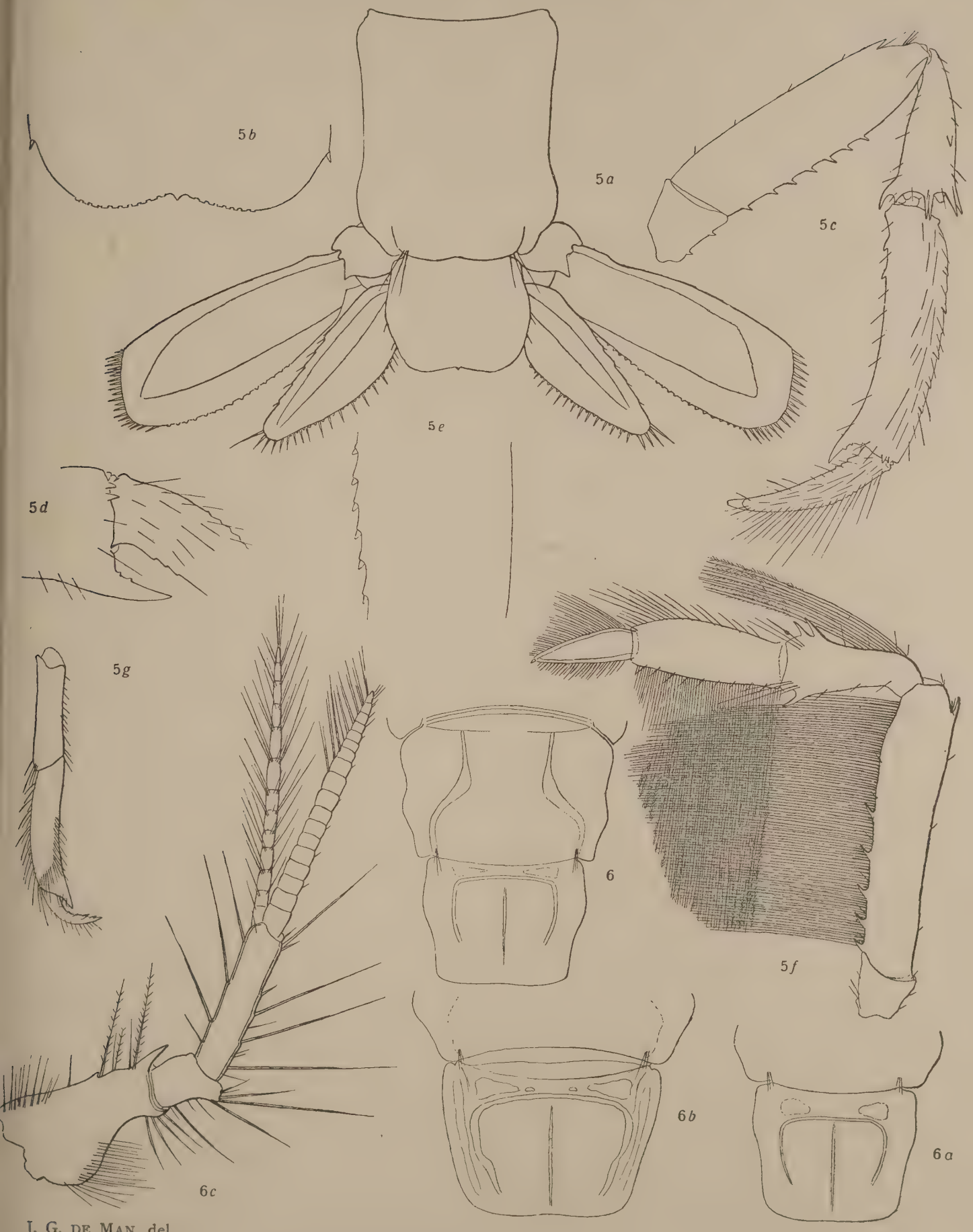
PLATE III.

Fig. 5*a*—5*g*. *Upogebia* (*Upogebia*) *fallax* de Man. Type specimen from Haingsisi. — 5*a* Caudal fan, × 30, the long feathered hairs on the margins of the telson and uropods are lost; 5*b* posterior margin of telson, × 75; 5*c* one of the legs of 1st pair, looked at from the inner side, × 30; 5*d* basal part of dactylus and fixed finger of this leg, inner side, × 60; 5*e* a part of the distal half of the dactylus, outer side, presenting the teeth on the upper border, × 150; 5*f* leg of 2nd pair, outer side, × 30; 5*g* carpus, propodus and dactylus of 5th leg, × 30.

Fig. 6—6*c*. *Upogebia* (*Upogebia*) *carinicauda* Stimps. — 6 Sixth segment of abdomen and telson of the female, long 35 mm., from the beach of Thursday Island, belonging to the British Museum and which in 1884 was referred by E. J. MIERS to *Gebia carinicauda* Stimps., × 7½; 6*a* telson of an egg-bearing female, long 22½ mm., from Stat. 213, × 11; 6*b* telson of an ova-bearing female, long 33 mm., from Ambon, × 11; 6*c* left antennule of the ova-bearing female from Ambon, lateral view, × 30.



J. G. DE MAN, del.

PLATE IV.

Fig. 6*d*—6*n*. *Upogebia* (*Upogebia*) *carinicauda* Stimps. — 6*d* Left antennal peduncle of this female, looked at from the supero-internal surface, × 30, (setae not drawn, except on the scaphocerite); 6*e* left cheliped, outer side, of a male, long 23 mm., from Stat. 58, × 11; 6*f* lower border of the merus of this cheliped, × 30; 6*g* distal border of the carpus of this leg, outer side, × 30; 6*h* fixed finger of this cheliped, looked at somewhat obliquely, × 30; 6*i* lower border of chela and immobile finger of the right leg of a young female, long 18 m., from Stat. 58, inner side, × 45; 6*j* left cheliped, outer side, of a female, long 25 mm., from Amboina, × 11 (my private collection); 6*k* immobile finger of this cheliped, × 37 1/2; 6*l* leg of 2nd pair of the male, long 23 mm., from Stat. 58, × 15 (hairs not drawn); 6*m* leg of 5th pair of the egg-bearing female from Ambon, × 15; 6*n* chela of this leg, × 37 1/2.

Fig. 7—7*a*. *Upogebia* (*Upogebia*) sp. β. Female from Stat. 174. — 7 Left cheliped, outer side, × 11; 7*a* fingers of this cheliped, inner side, × 37 1/2.

J. G. DE MAN, del.

PLATE V.

Fig. 8—8*e*. *Upogebia* (*Upogebia*) *pugnax* de Man. Female from Stat. 311. — 8 Front and anterior border of carapace, with the left antennal peduncle, × 56 (the right sidewall of the carapace projects laterally a little more forward than the left); 8*a* lateral view of rostrum and anterior border of carapace, with the left eyepeduncle, × 56; 8*b* caudal fan, × 19; 8*c* left antennule and left antennal peduncle, looked at from the lower side, × 37 1/2; 8*d* right leg of 1st pair, outer side, × 19; 8*e* immobile finger and anterior border of palm, inner side, × 56.

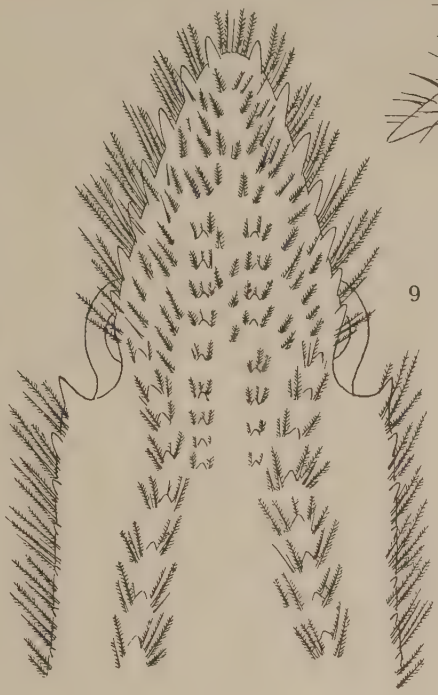
J. G. DE MAN, del.

PLATE VI.

Fig. 8*f*. *Upogebia* (*Upogebia*) *pugnax* de Man. — Propodus and dactylus of the left leg of 5th pair, viewed from the inner side, × 37 1/2.

Fig. 9—9*g*. *Upogebia* (*Upogebia*) *ceratophora* de Man. — 9 Rostrum and anterior part of carapace of the female from Stat. 53, × 56; 9*a* rostrum of the same specimen, lateral view, × 75; 9*b* sixth segment and caudal fan of the same female, × 28; the posterior margin of the telson is somewhat asymmetrical, the left lobe being a little larger than the right; 9*c* left leg of 1st pair of the specimen from Stat. 58, outer side, × 37 1/2; 9*d* inner view of the carpus and of the propodus of this leg, × 37 1/2; 9*e* tooth near the distal end of the upper border of the merus of this leg, × 150; 9*f* posterior tooth of the lower border of the merus of this leg, × 150; 9*g* immobile finger, of this leg, inner side, × 150.

Fig. 10. *Upogebia* (*Upogebia*) *monoceros* de Man. Female from Stat. 4. — Rostrum and anterior part of carapace, × 56.



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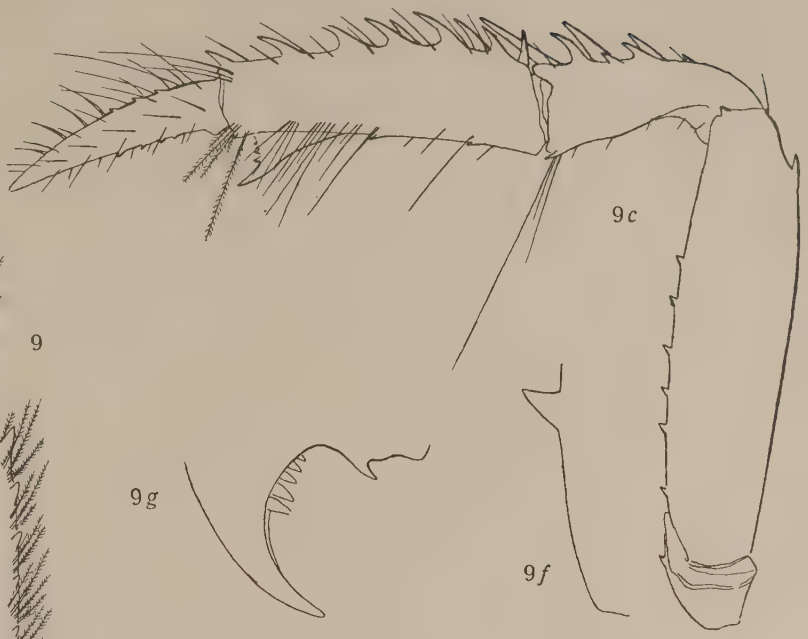
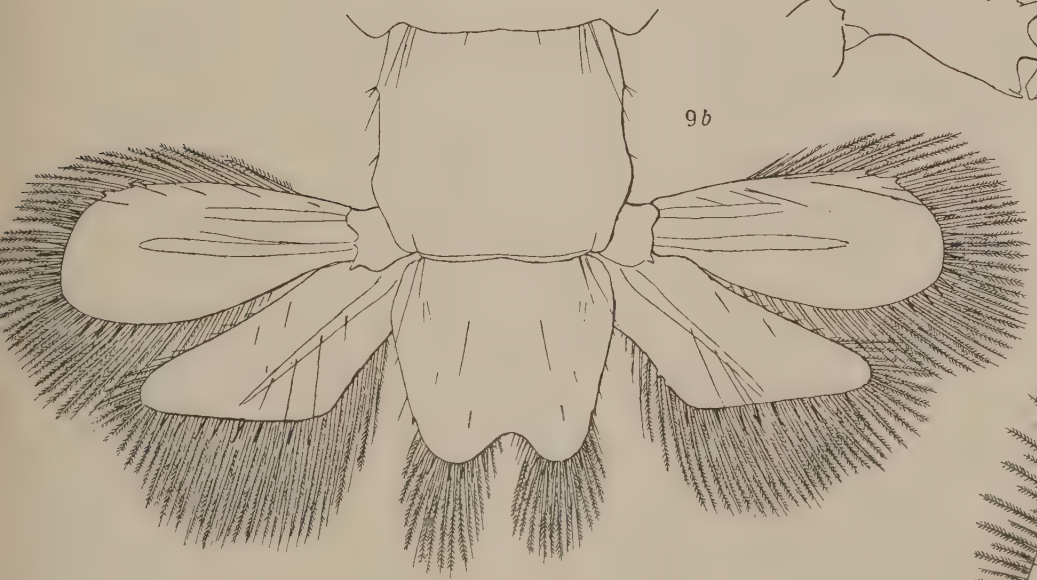


9*c*

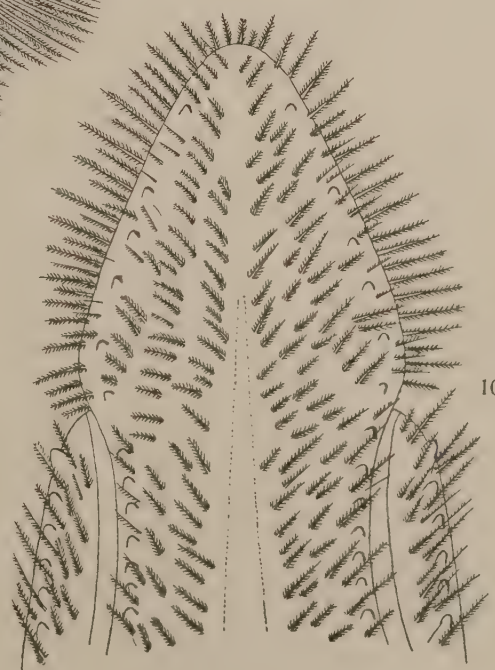
9*g*

9*f*

9*d*



9*b*



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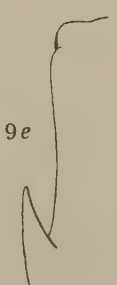
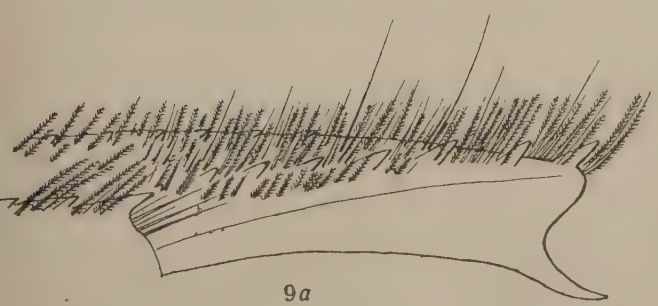


9*e*



9*a*

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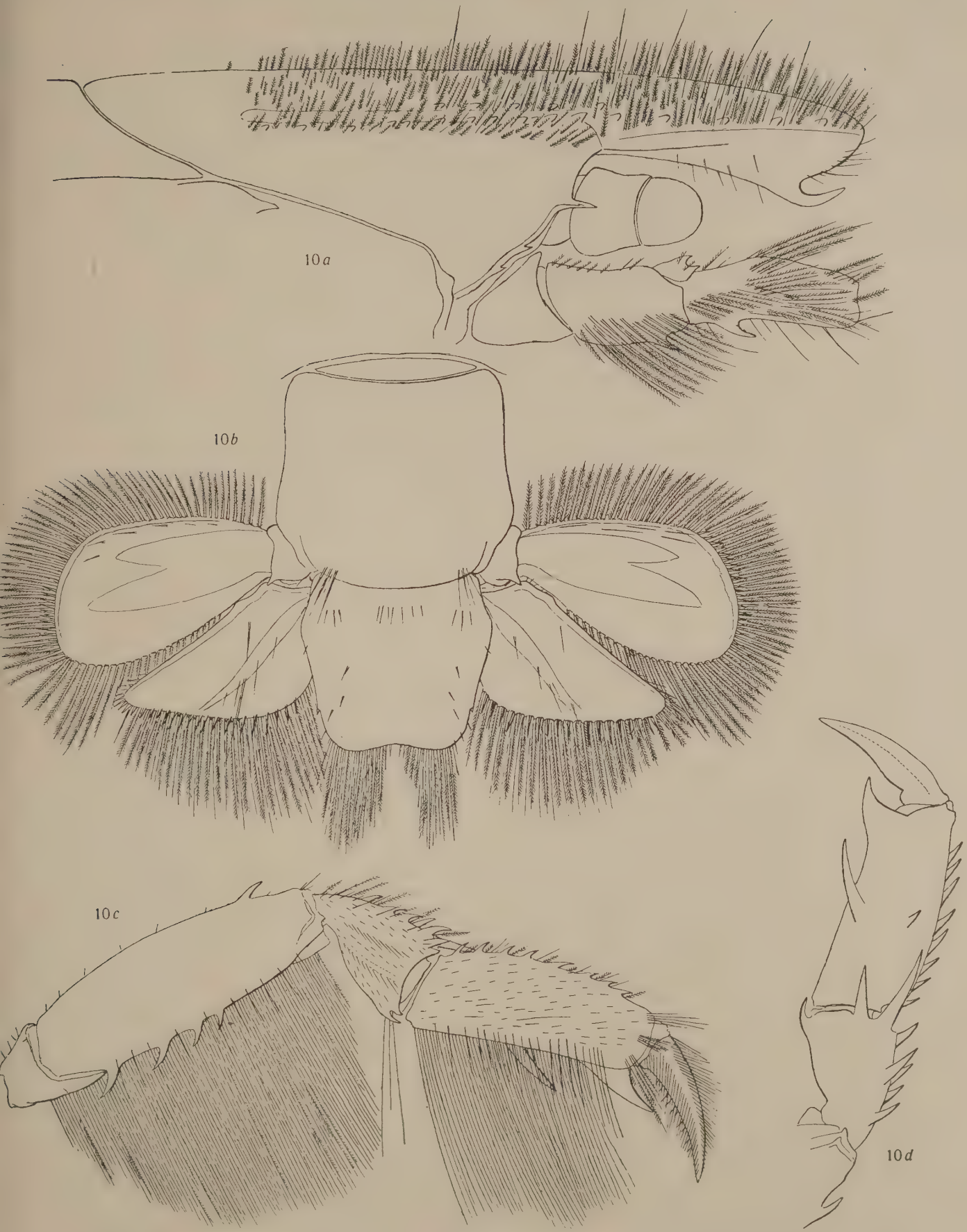
PLATE VII.

Fig. 10*a*—10*d*. *Upogebia (Upogebia) monoceros* de Man. — 10*a* Lateral view of rostrum, anterior part of carapace until the cervical groove, eyepeduncle and right antennal peduncle, the last joint excepted, × 56; 10*b* sixth segment of abdomen and caudal fan, × 28; 10*c* right leg of 1st pair, looked at from the outer side, × 28, without coxo- and basipodite; 10*d* carpus and subchela of the same leg, looked at from the inner side, × 28, hairs and feathered setae omitted.

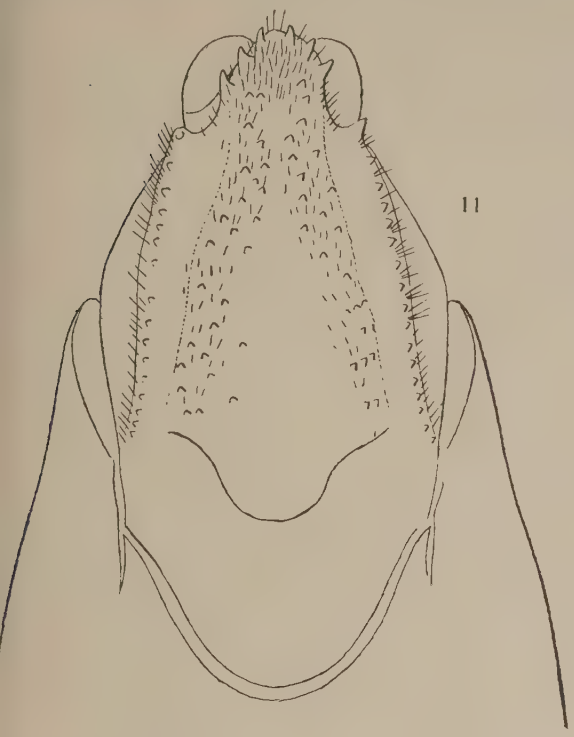


J. G. de Man, del.

PLATE VIII.

Fig. 11—11*f*. *Upogebia* (*Calliadne*) *hexaceras* Ortm. All the figures are taken from the ova-bearing female from Stat. 164. — 11 Anterior part of carapace with the eyes, × 22½; 11*a* lateral view of the rostrum, × 56; 11*b* sixth segment of abdomen, telson and right uropods, × 15; 11*c* left antennule, × 30; 11*d* lateral view of the fingers of the left cheliped, outer side, × 22½; 11*e* the same fingers looked at from the inner side and somewhat obliquely, to show more distinctly the small teeth on the cutting-edge of the immobile finger and the obtuse tooth on the dactylus, × 37½; 11*f* left leg of 2nd pair, outer side, × 12½, the long hairs with which this leg is furnished, are omitted, because they resemble those of *Upog. ancylodactyla*.

Fig. 12—12*b*. *Upogebia* (*Calliadne*) *Darwinii* Miers. — 12 Anterior part of carapace with the eyes, of an adult male of *Gebiopsis intermedia* de Man, cotype from the Mergui Archipelago, out of my private collection, × 9; 12*a* sixth segment and telson of this male, × 9; 12*b* left cheliped of 1st pair, outer side, of this male, × 9.



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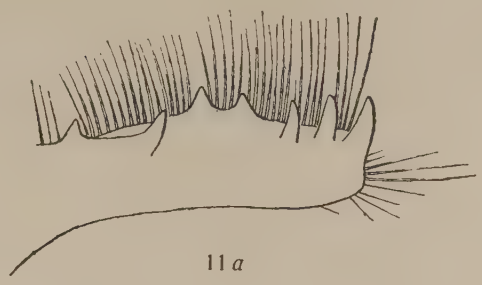
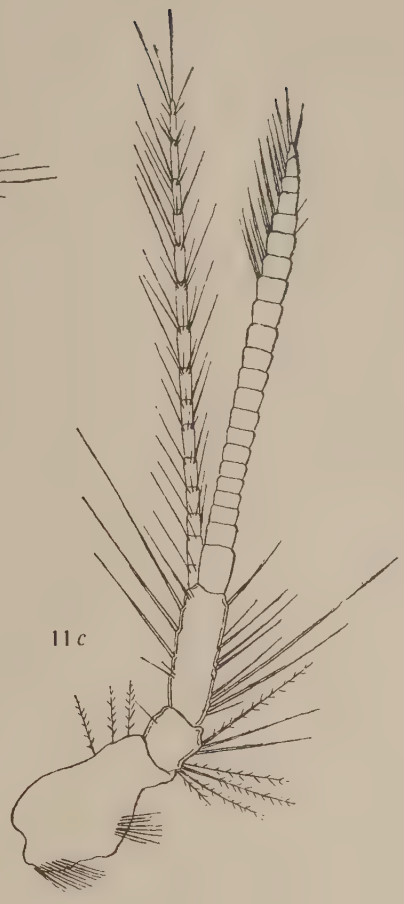
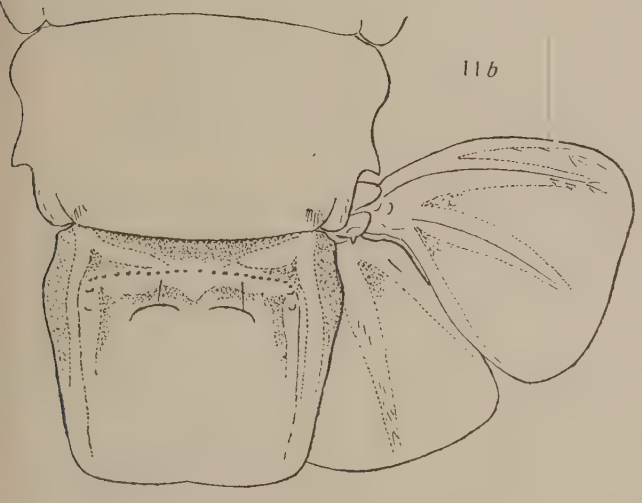


11*a*

11*d*



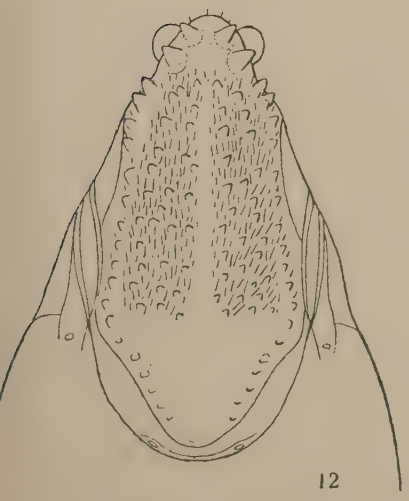
11*c*



11*b*

11*e*

11*f*



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12*a*

12*b*

J. G. DE MAN, del.

PLATE IX.

Fig. 12*c*—12*f*. *Upogebia* (*Calliadne*) *Darwinii* Miers. — 12*c* Left antennule of this male, × 19; 12*d* the five last segments of the thicker flagellum of this antennule, × 75; 12*e* the left antennule of the ova-bearing female, long 38 mm., from Ambon, × 19; 12*f* the five last segments of the thicker flagellum of this antennule, × 75.

Fig. 13—13*h*. *Upogebia* (*Calliadne*) *ancylodactyla* de Man. — 13 Anterior part of carapace of the ova-bearing female from Stat. 60, × 22½; 13*a* sixth segment of abdomen and telson of this female, × 15; 13*b* left antennule of this female, × 30; 13*c* left cheliped of this female, outer side, × 15; 13*d* lower border of the merus of this leg, × 37½; 13*e* fingers of this leg, × 37½; 13*f* left leg of 2nd pair of this female, × 15; 13*g* lateral view of rostrum and right eyepeduncle of the specimen from Stat. 323, × 75, hairs omitted; 13*h* telson of this specimen, × 19.

J. G. DE MAN, del.

PLATE X.

Fig. 13*i*—13*j*. *Upogebia* (*Calliadne*) *ancylodactyla* de Man. — 13*i* Antennule of the specimen from Stat. 323, lateral view, × 37 1/2; 13*j* fingers of the left cheliped of this specimen, × 37 1/2.

Fig. 14—14*a*. *Upogebia* (*Calliadne*) *ancylodactyla* de Man var. *amboinensis* de Man. — 14 Telson of a female, long 19 mm., of *Gebiopsis intermedia* de Man var. *amboinensis* de Man, cotype out of my private collection, from Amboina, × 15; 14*a* antennule of this specimen, lateral view, × 30.

Fig. 15—15*c*. *Callianassa* (*Calliactites*) sp. Specimen from Stat. 86, long 5,64 mm. — 15 Sixth segment of abdomen and caudal fan, × 37 1/2; 15*a* posterior margin of telson, × 150; 15*b* external maxilliped, × 56; 15*c* left leg of 3rd pair, × 56.

Fig. 16—16*b*. *Callianassa* (*Calliactites*) *modesta* de Man. The figure 16 is taken from the female, long 13,7 mm., from Stat. 116, the figures 16*a* and 16*b* from the female, long 13,4 mm., from Stat. 261. — 16 Sixth segment of abdomen and caudal fan, × 19; 16*a* external maxilliped, × 30; 16*b* larger cheliped, outer side, × 13 1/2.

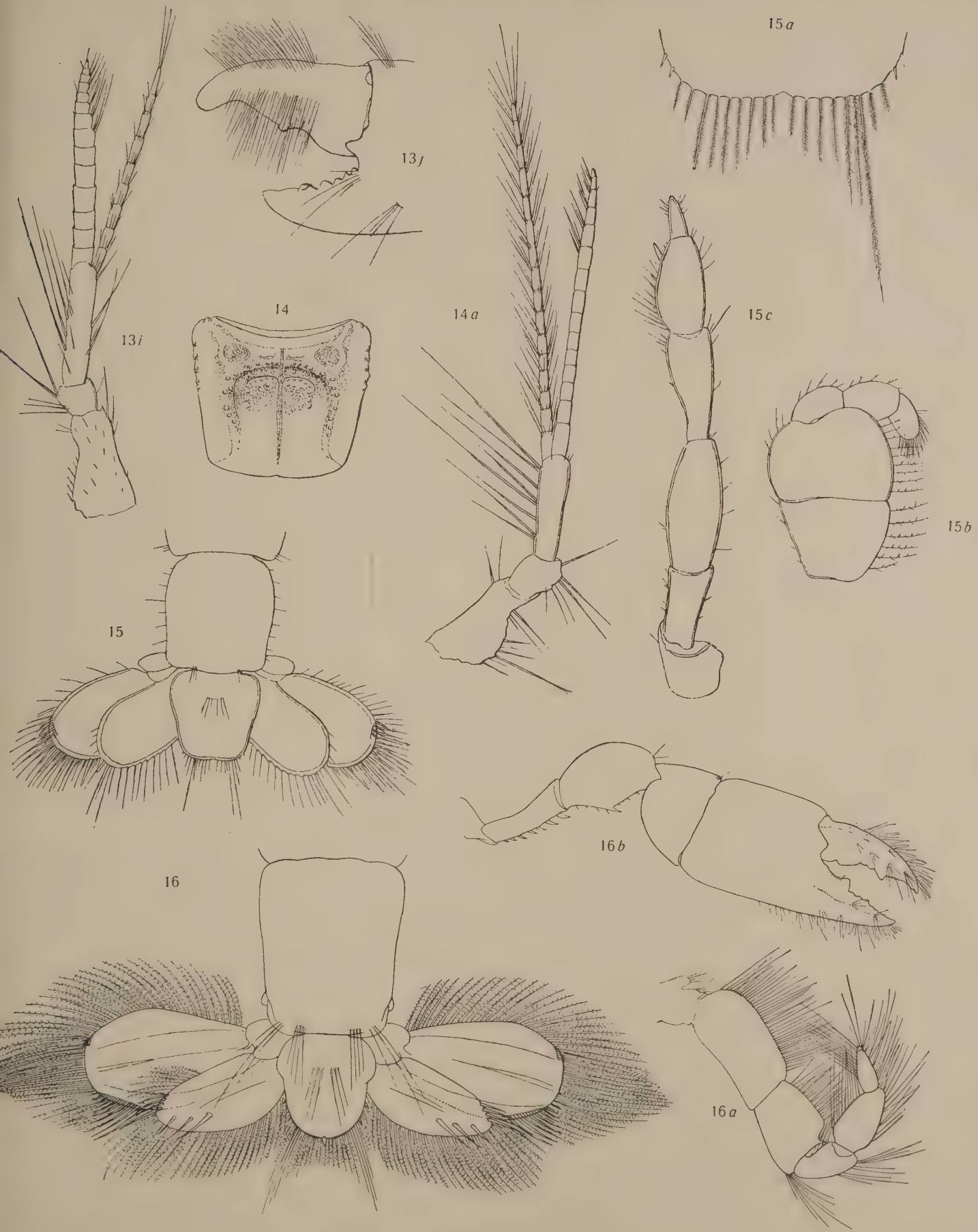


Fig. 13*i*, 13*j*, 14, 14*a*, 15—15*c* J. G. DE MAN, Fig. 16—16*b* J. F. OBBES, del.

PLATE XI.

Fig. 16*c*—16*e*. *Callianassa* (*Calliactites*) *modesta* de Man. The figures 16*c* and 16*d* are taken from the female, long 13,7 mm., from Stat. 116, the figure 16*e* from the female, long 13,4 mm., from Stat. 261. — 16*c* Smaller cheliped, $\times 13^1/_2$; 16*d* immovable finger of this cheliped, $\times 22^1/_2$; 16*e* leg of 3rd pair, outer side, $\times 30$.

Fig. 17—17*e*. *Callianassa* (*Cheramus*) *Sibogae* de Man. — 17 Frontal region of the carapace, with eyestalks, antennules and antennal peduncles, $\times 22^1/_2$; 17*a* frontal region, eyestalks and basal joints of the antennules, $\times 37^1/_2$; 17*b* lateral view of frontal region and eyestalk, $\times 22^1/_2$; 17*c* sixth segment of abdomen and caudal fan, $\times 11$; 17*d* posterior border of telson, $\times 22^1/_2$; 17*e* external maxilliped, $\times 15$. In the figures 17 and 17*a* the frontal border is looked at obliquely from before, so that the rostrum appears shorter than basal antennular article.
Excepting fig. 17*b* the other figures of this species are drawn by the author.

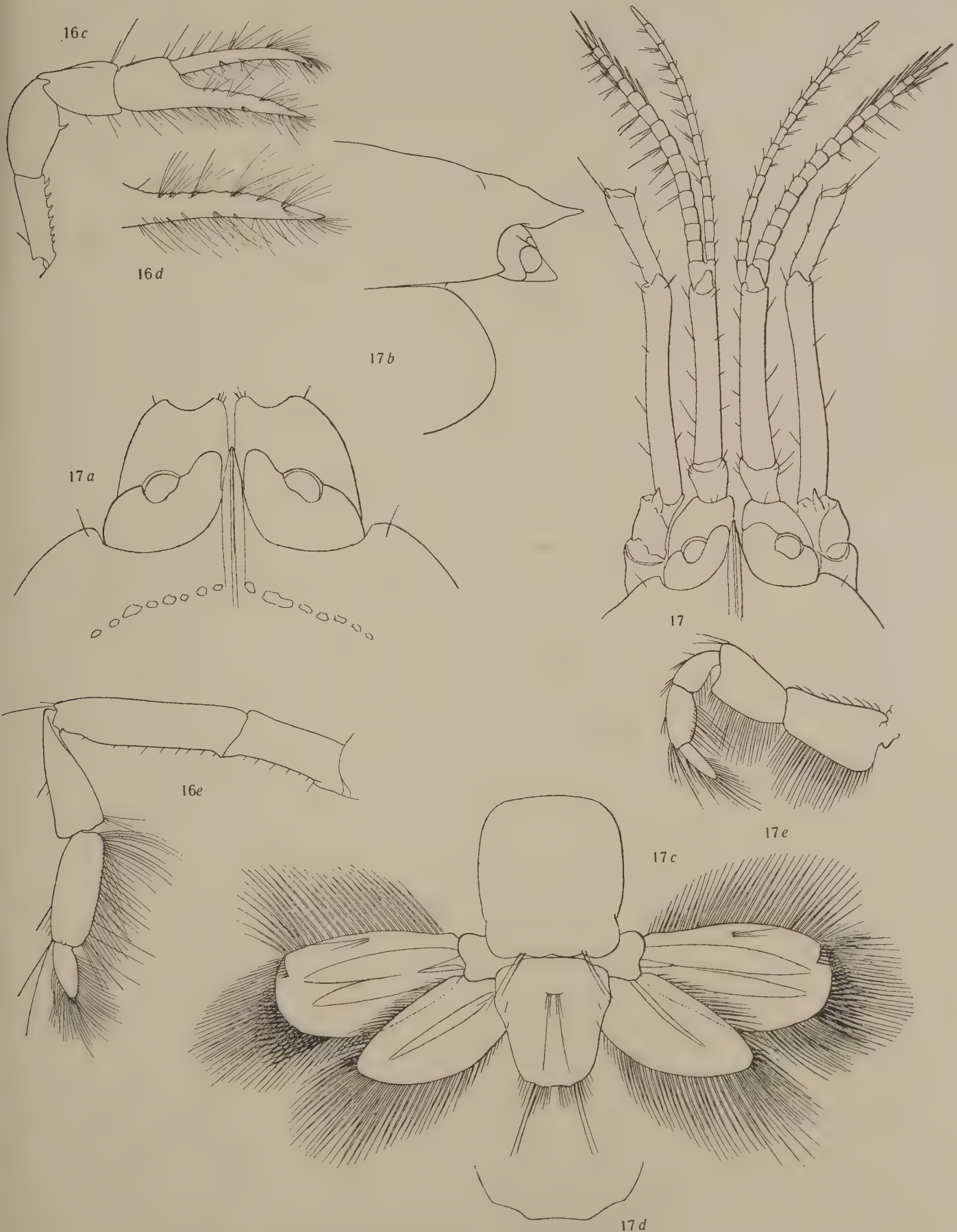
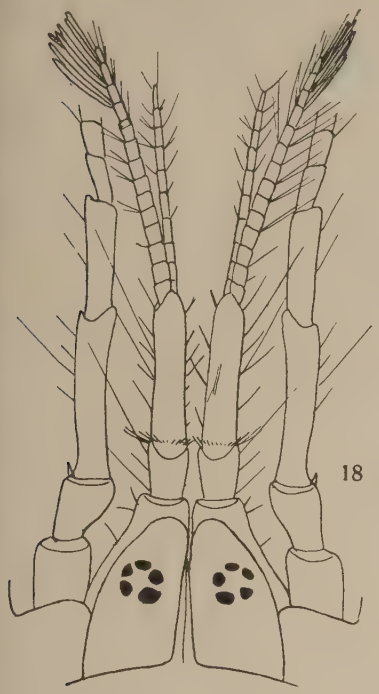


Fig. 16*c*—16*e*, 17*b* J. F. OBBES, 17, 17*a*, 17*c*—17*e* J. G. DE MAN, del.

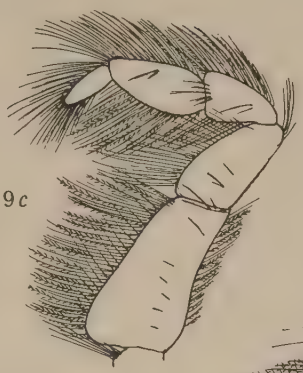
PLATE XII.

Fig. 18—18*d*. *Callianassa* (*Cheramus*) *propinqua* de Man. — 18 Frontal region with the eyestalks, the antennules and antennal peduncles, × 37 1/2; 18*a* sixth segment of abdomen and caudal fan, × 22 1/2; 18*b* external maxilliped, × 37 1/2; 18*c* smaller cheliped, × 30; 18*d* right leg of 3rd pair, outer side, × 37 1/2.

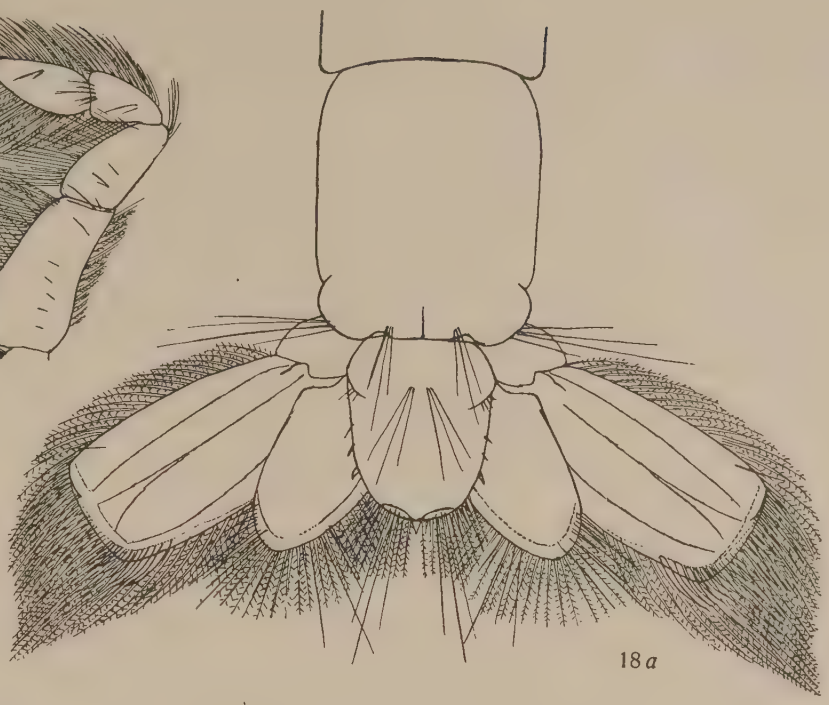
Fig. 19, 19*b*—19*c*. *Callianassa* (*Cheramus*) *joculatrix* de Man. — 19 Frontal region of carapace of the female, long 14,5 mm., from Stat. 19 with eyestalks, antennules and antennal peduncles, × 37 1/2; 19*b* telson of a young specimen, long 13 mm., from Stat. 2, of the variety, × 37 1/2; 19*c* external maxilliped of a female, long 16,8 mm., from Stat. 19, outer side, × 22 1/2.



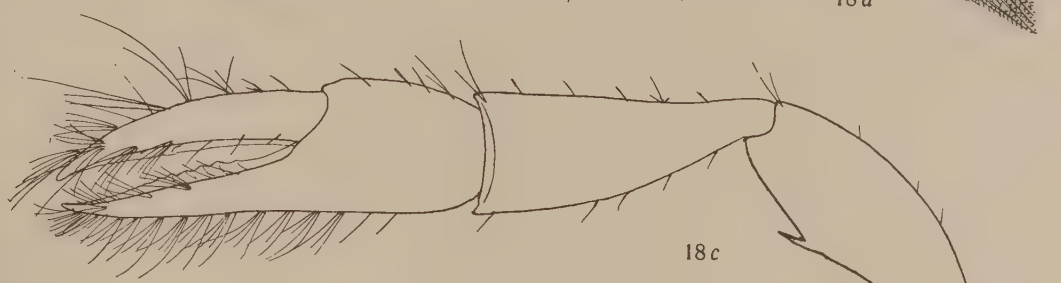
18



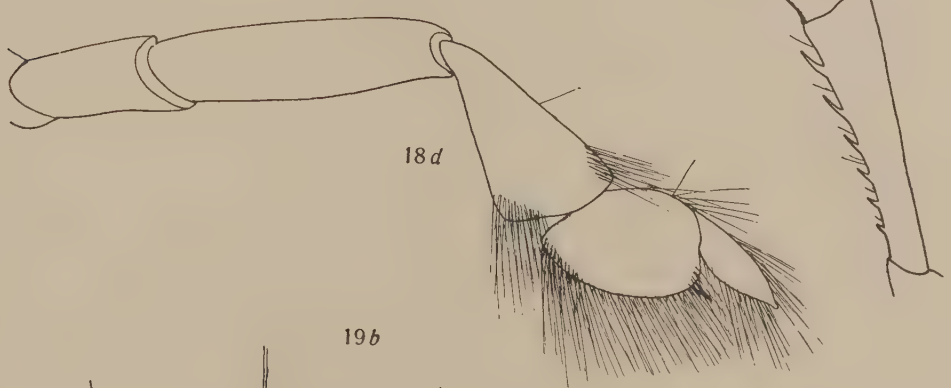
19*c*



18*a*

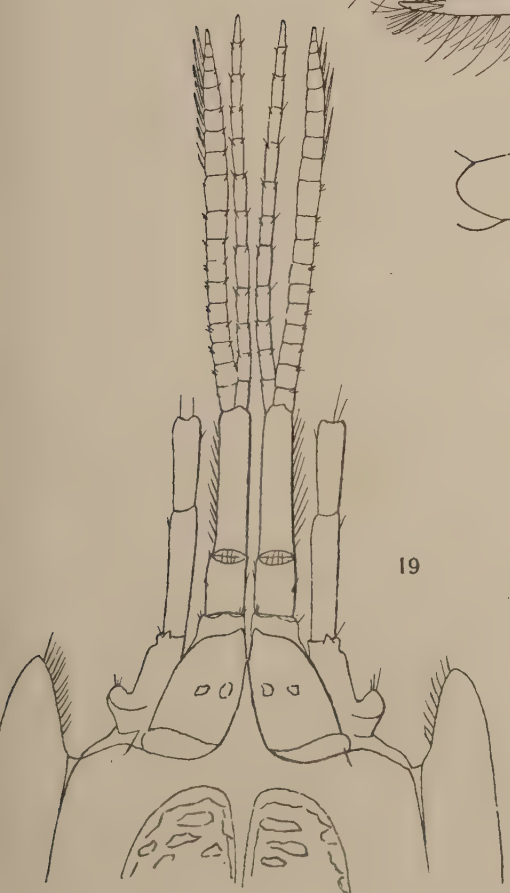


18*c*

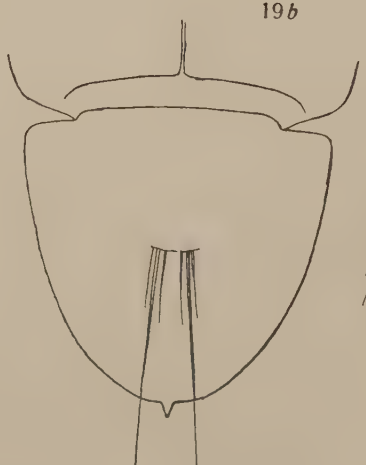


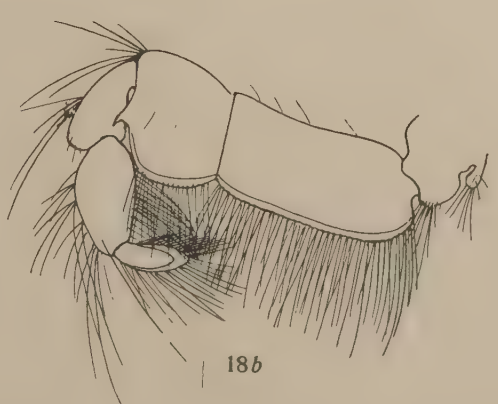
18*d*

19*b*



19





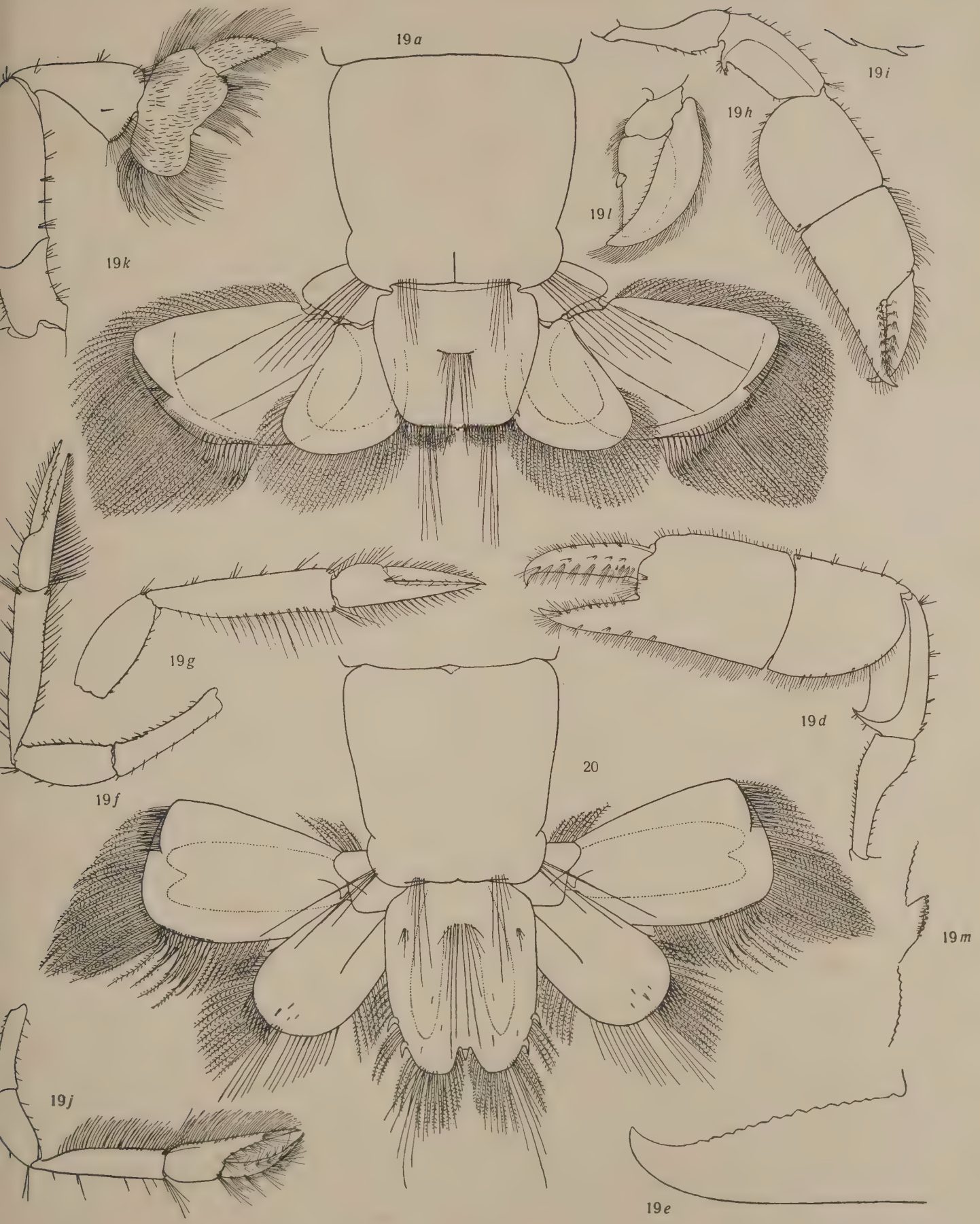
18*b*

J. F. OBBES, del.

PLATE XIII.

Fig. 19*a*, 19*d*—19*m*. *Callianassa* (*Cheramus*) *joculatrix* de Man. —19*a* Sixth segment of abdomen and caudal fan of the female, long 14,5 mm., from Stat. 19, × $22^1/_2$; 19*d* larger cheliped of the female, long 16,8 mm., from Stat. 19, outer side, × $11^1/_4$; 19*e* fixed finger of this cheliped, × 30; 19*f* smaller cheliped of this female, × 15; 19*g* smaller cheliped of the female, long 18,3 mm., from Stat. 19, × 15; 19*h* larger cheliped of the female, long 14,5 mm., from Stat. 19, in which the carpus is longer than the palm, × $11^1/_4$; 19*i* the two teeth on the ischium of this cheliped, × $37^1/_2$; 19*j* smaller cheliped of the young specimen, long 13 mm., from Stat. 2, of the variety, × 15; 19*k* right leg of the 3rd pair of the female, long 18,3 mm., from Stat. 19, × $22^1/_2$; 19*l* left pleopod of 5th pair of this female, × $11^1/_4$; 19*m* stylamblys of this pleopod, × 56.

Fig. 20. *Callianassa* (*Cheramus*) *lobetobensis* de Man. — 20 Sixth segment of abdomen and caudal fan of the ova-bearing female, long 20 mm., from Stat 306, × 19.



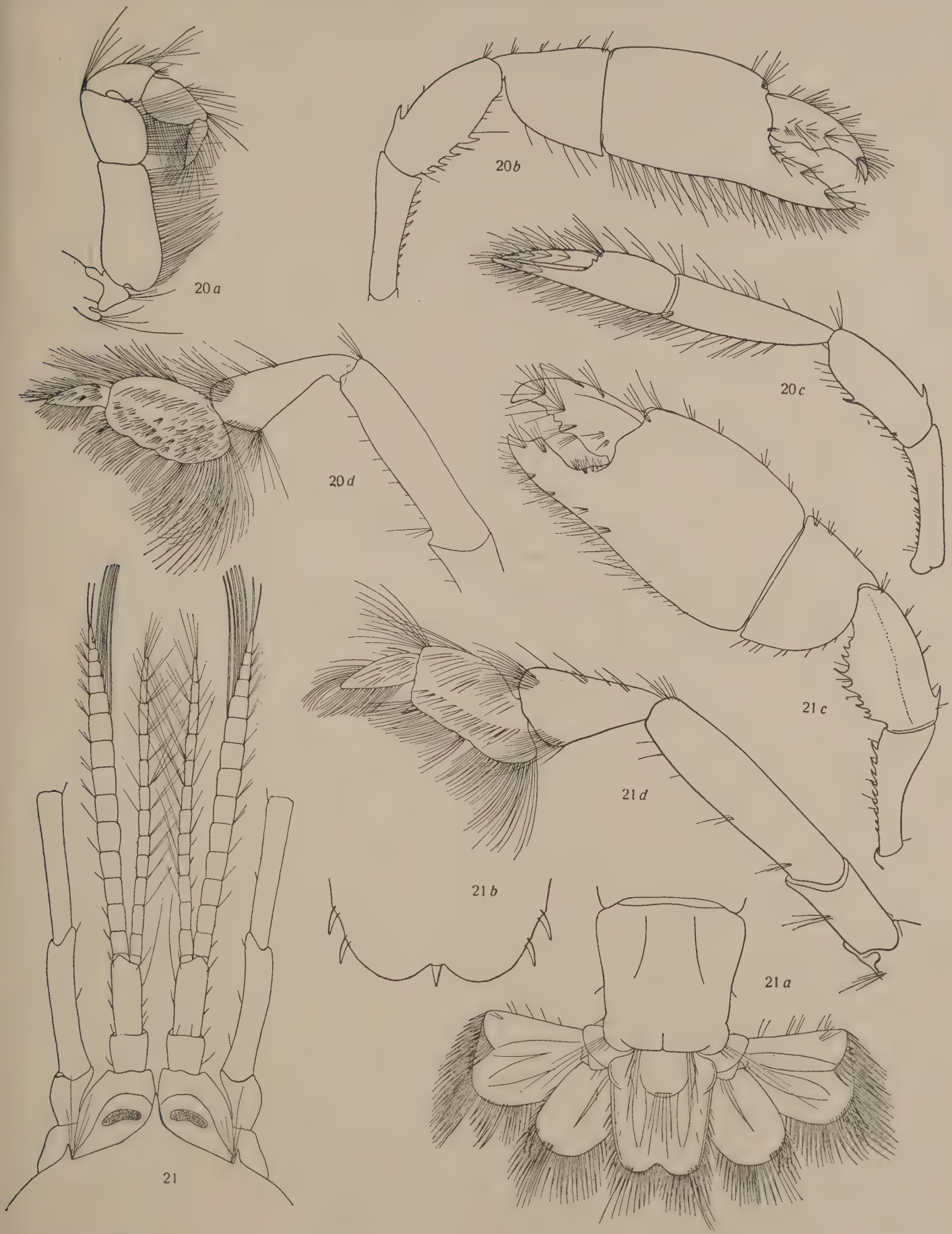
J. F. OBBES, del.

PLATE XIV.

Fig. 20*a*—20*d*. *Callianassa* (*Cheramus*) *lobetobensis* de Man. — 20*a* External maxilliped, outer side, of the ova-bearing female, long 20 mm., from Stat. 306, × 22½; 20*b* larger cheliped, outer side, × 15; 20*c* smaller cheliped, outer side, × 15; 20*d* third leg, × 22½.

Fig. 21—21*d*. *Callianassa* (*Cheramus*) *intermedia* de Man. — 21 Frontal region with eyestalks, antennules and antennal peduncles, × 37½; 21*a* sixth segment of abdomen and caudal fan, × 15; 21*b* posterior part of telson, × 37½; 21*c* larger cheliped, × 15; 21*d* left leg of 3rd pair, × 30.

(In Fig. 21 the number of segments is one too much both in the upper and in the lower flagellum and on the antennal peduncle a scaphocerite which is perhaps wanting, is not drawn).



J. F. OBBES, del.

PLATE XV.

Fig. 22—22*d*. *Callianassa* (*Cheramus*) *praedatrix* de Man. — 22 Sixth segment of abdomen and caudal fan, × 13½; 22*a* telson, × 19; 22*b* external maxilliped, × 19; 22*c* larger cheliped, outer side, × 11¼; 22*d* leg of 3rd pair, × 19 (the figure 22*a* has been drawn by the author, because in fig. 22 the telson is drawn too short).

Fig. 23—23*a*. *Callianassa* (*Cheramus*) *pugnatrix* de Man. — 23 Frontal region with eyestalks, antennules and antennal peduncles, × 37½; 23*a* sixth segment of abdomen and caudal fan, × 15.

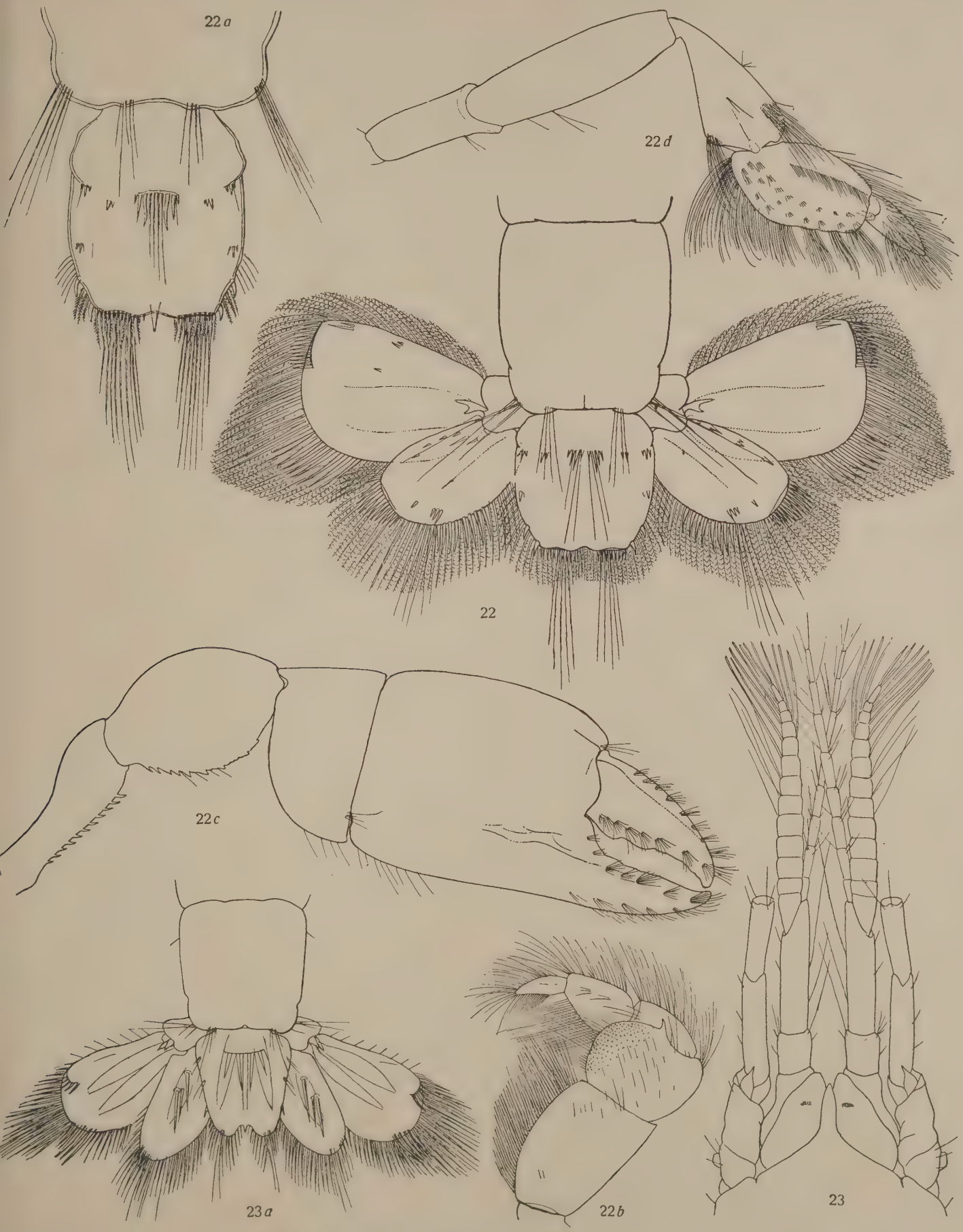


Fig. 22, 22*b*—22*d*, 23, 23*a* J. F. Obbes, 22*a* J. G. de Man, del.

PLATE XVI.

Fig. 23*b*—23*e*. *Callianassa* (*Cheramus*) *pugnatrix* de Man. — 23*b* Posterior part of telson, × 56; 23*c* external maxilliped, × 30; 23*d* larger cheliped, × 15; 23*e* leg of 3rd pair, outer side, × 30.

Fig. 24—24*g*. *Callianassa* (*Cheramus*) *pygmaea* n. sp. — 24 Frontal region with eyestalks, antennulae and antennal peduncles, × 37 1/2; 24*a* terminal part of rostrum, × 112 1/2; 24*b* sixth segment of abdomen and caudal fan, × 25; 24*c* posterior border of telson, × 75, hairs omitted; 24*d* thinner flagellum of antennule, × 75; 24*e* external maxilliped, × 37 1/2; 24*f* smaller cheliped, × 25; 24*g* leg of 3rd pair, × 37 1/2.

Fig. 25—25*a*. *Callianassa* (*Cheramus*) *moluccensis* de Man. — 25 Anterior part of carapace with eyestalks and the peduncles of the inner and outer antennae, × 6 3/4; 25*a* lateral view of frontal region and eyestalks, × 6 3/4.

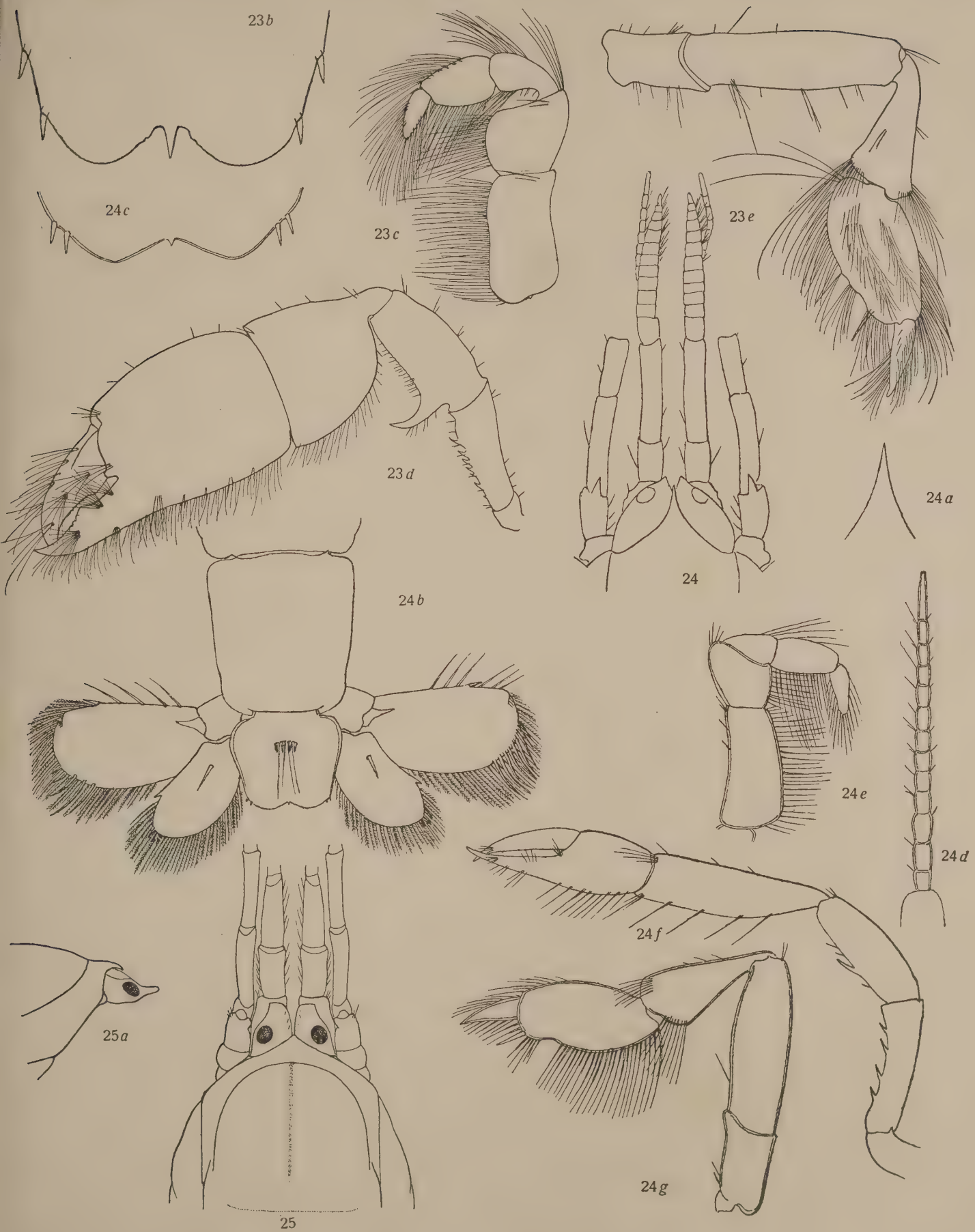


Fig. 23*b*—23*e* J. F. OBBES, 24—24*g* J. G. DE MAN, 25, 25*a* J. F. OBBES, del.

PLATE XVII.

Fig. 25*b*—25*c*. *Callianassa* (*Cheramus*) *moluccensis* de Man. — 25*b* Sixth segment of abdomen and caudal fan, × 6; 25*c* pleopod of 1st pair, × 15 (Fig. 25*c* has been drawn by the author).

Fig. 26—26*g*. *Callianassa* (*Cheramus*) *indica* de Man. — 26 Carapace, eyestalks, and the two pairs of antennae, × 3; 26*a* frontal region, eyestalks and the peduncles of the two pairs of antennae, × $7^1/_2$; 26*b* tips of the eyestalks, × $37^1/_2$; 26*c* sixth segment of abdomen and caudal fan, × $2^1/_4$; 26*d* left external maxilliped, × $3^3/_4$; 26*e* smaller cheliped, × $3^3/_4$; 26*f* pleopod of 1st segment, × $11^1/_4$ (the terminal segment has probably lost many setae); 26*g* distal border of terminal segment of this pleopod, × $37^1/_2$.

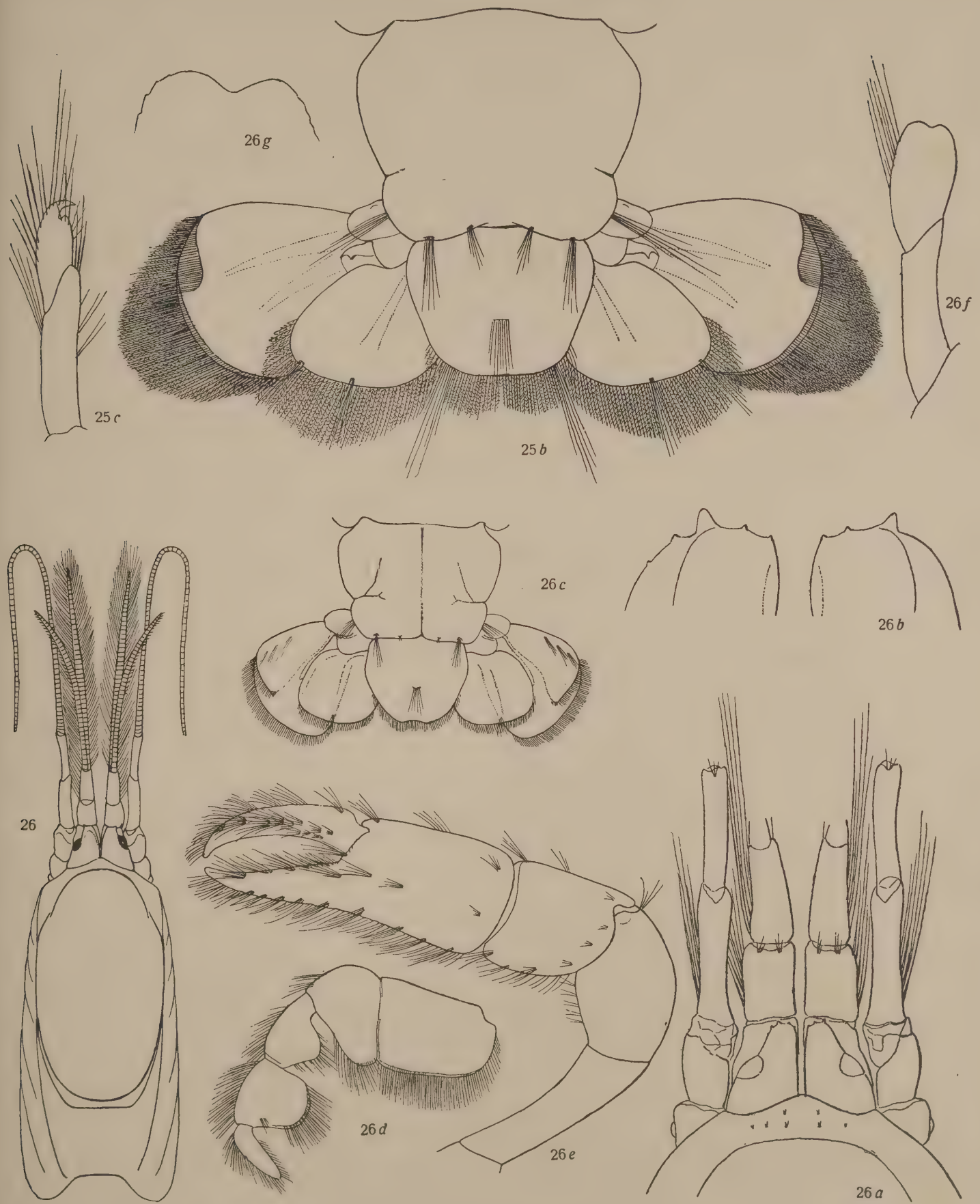


Fig. 25*b*, 25*c*, 26*a*, 26*f*, 26*g* J. G. DE MAN, 26, 26*b*—26*e* J. F. OBBES, del.

PLATE XVIII.

Fig. 27—27*a*. *Callianassa* (*Cheramus*) *Jousseaumei* Nobili. — 27 External maxilliped of a cotype, male, long 60 mm., of *Call.* (*Cheramus*) *Jousseaumei* Nobili from the Red Sea (Mus. Turin), outer side, × 4 1/2; 27*a* pleopod of 1st segment of this cotype, × 15 (These two figures are drawn by the author).

Fig. 28—28*c*. *Callianassa* (*Trypaea*) *amboinensis* de Man. — 28 Frontal region of carapace and eyestalks, × 30; 28*a* sixth segment of abdomen and caudal fan, × 13 1/2; 28*b* posterior border of telson, × 82; 28*c* right leg of 3rd pair, outer side, × 19. All these figures are taken from the female from Stat. 133.

Fig. 29—29*b*. *Callianassa* (*Callichirus*) *placida* de Man. All the figures are taken from the female from Stat. 142. — 29 Frontal border of carapace with eyestalks, antennules and antennal peduncles, × 19; 29*a* sixth segment of abdomen and caudal fan, × 15; 29*b* external maxilliped, outer side, × 19. (The figures 29*a* and 29*b* are drawn by the author).

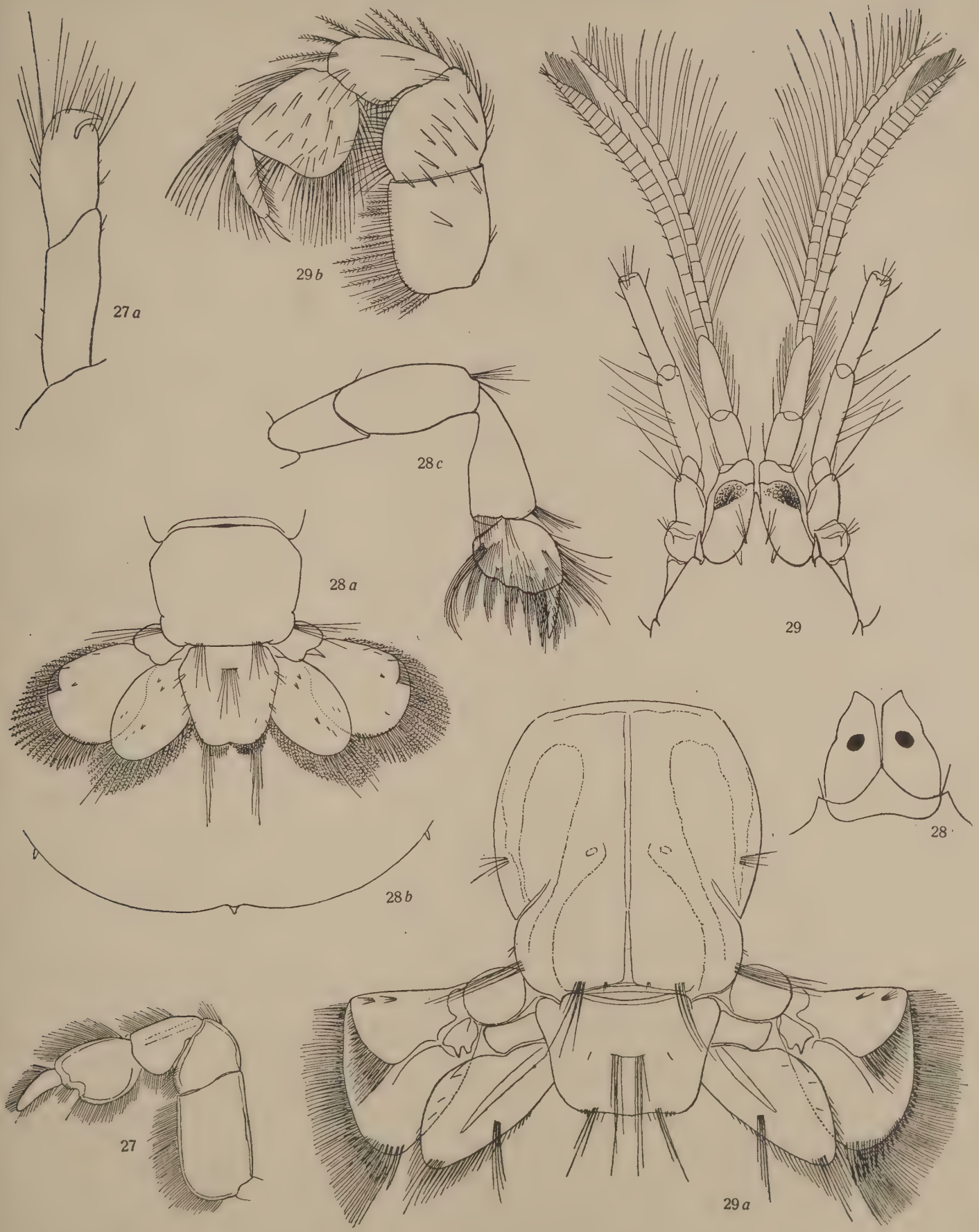


Fig. 27, 27*a*, 29*a*, 29*b* J. G. DE MAN, 28—28*c*, 29 J. F. OBBES, del.

PLATE XIX.

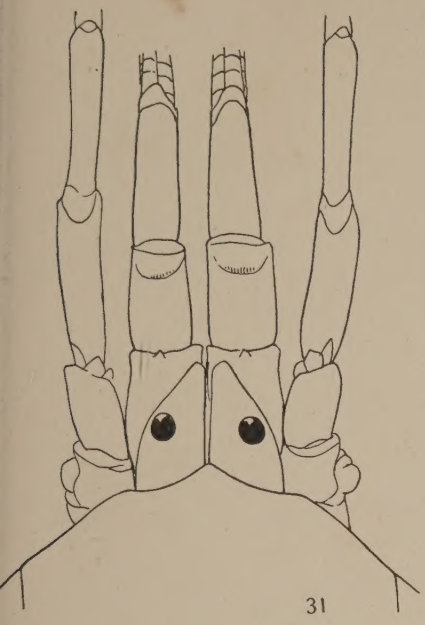
Fig. 29*c*—29*e*. *Callianassa* (*Callichirus*) ***placida*** de Man. — 29*c* Larger, 29*d* smaller cheliped, outer side, $\times 11^1/_4$; 29*e* leg of 3rd pair, outer side, $\times 19$.

Fig. 30—30*e*. *Callianassa* (*Callichirus*) *mucronata* Strahl. The figures 30—30*c* are taken from the ova-bearing female, long 29 mm., from Stat. 125. — 30 Antennule, lateral view, $\times 22^1/_2$; 30*a* external maxilliped, $\times 15$; 30*b* larger cheliped, $\times 9$; 30*c* leg of 3rd pair, outer side, $\times 15$; 30*d* pleopod of 1st segment of the male from Stat. 174, $\times 22^1/_2$; 30*e* pleopod of 1st segment of a female from Ambon, $\times 22^1/_2$.

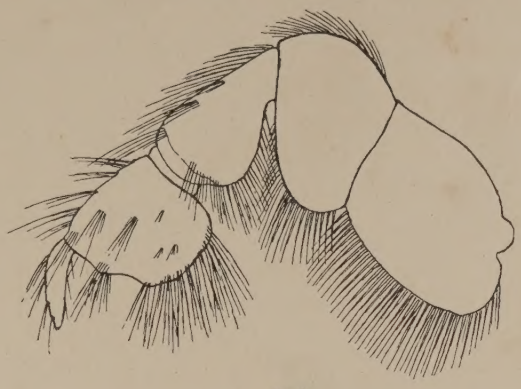
Fig. 29*c*—29*e*, 30, 30*b*—30*e* J. F. OBBES, 30*a* J. G. DE MAN, del.

PLATE XX.

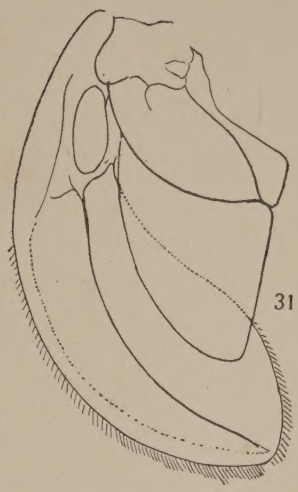
Fig. 31—31*i*. *Callianassa* (*Callichirus*) *audax* de Man. — 31 Frontal border of carapace with eyestalks and the peduncles of the two pairs of antennae, × 9; 31*a* sixth segment of abdomen and caudal fan, × 6; 31*b* external maxilliped, outer side, × $5^5/_8$; 31*c* larger cheliped, outer side, × $3^3/_4$; 31*d* fingers of this cheliped, × $7^1/_2$; 31*e* smaller cheliped, outer side, × $3^3/_4$; 31*f* leg of 3rd pair, outer side, × $6^3/_4$; 31*g* left pleopod of 1st, 31*h* of 2nd, 31*i* of 3rd pair, all × $5^5/_8$.



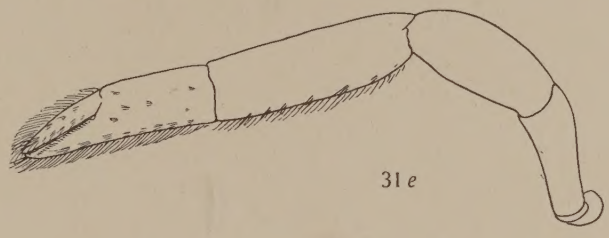
31



31 *b*

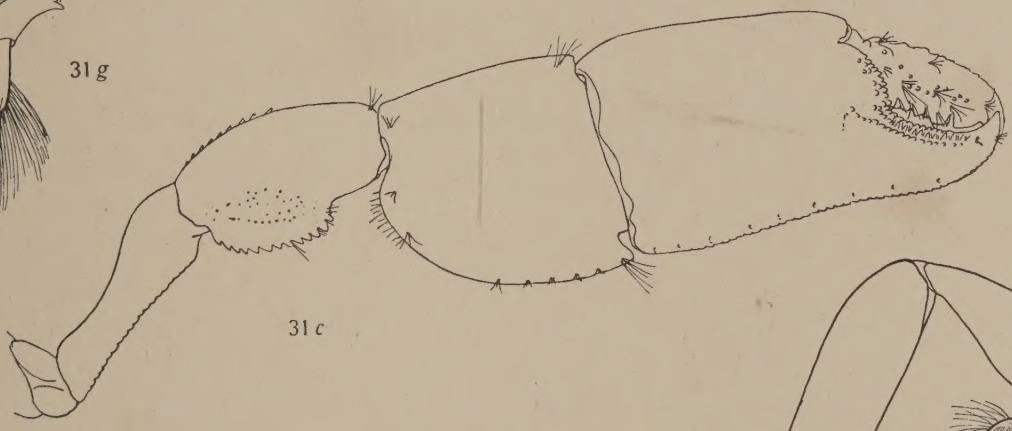


31 *i*

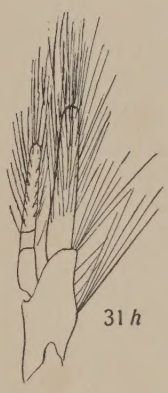


31 *e*

31 *g*

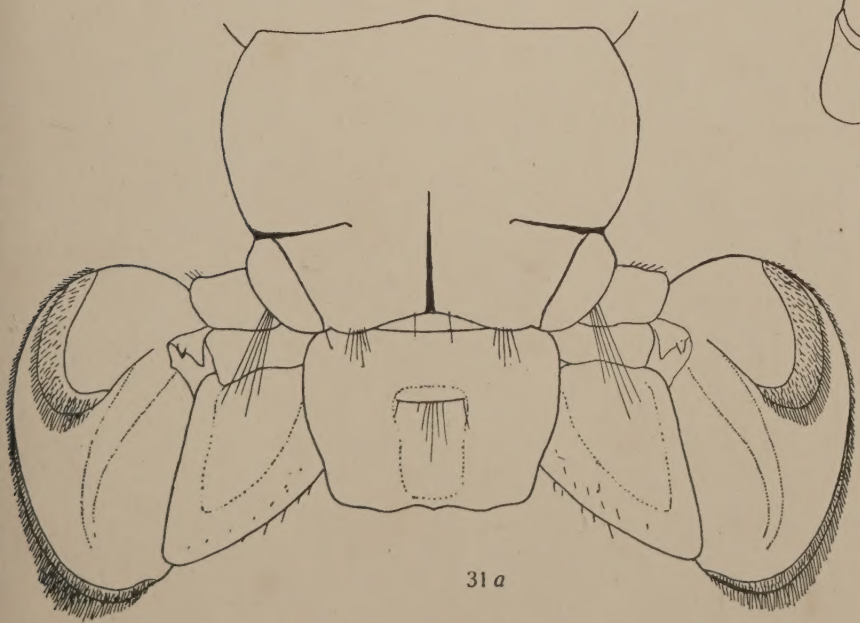


31 *c*



31 *h*

31 *f*



31 *a*

31 *d*

Fig. 31, 31*a*, 31*c*—31*i* J. F. OBBES, 31*b* J. G. DE MAN, del.